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# Matters are Moving!

THE first Weir Report indicated that the grid scheme could only attain a full measure of success if the railways, by electrifying, could ensure a high load factor and an outlet for the surplus energy from the scheme.

It was therefore appropriate that Lord Weir should again be called in to examine, with representatives of the interests concerned, the prospects of electrifying the main-line railways, the cost of this work, and means of carrying it out. From this the second Weir Report resulted and it would appear that, once again, the Government intends to translate the recommendations (or conclusions) into action.

The four main-line railway companies were asked to study the report and to express their views on the matter, and last week they transmitted to the Minister of Transport their considered reply to this request.

The Weir Committee estimated that a return of about 7 per cent. could be secured upon the new capital involved in electrification (£261,000,000). In their present state the railway companies would naturally be attracted by such a remunerative return, but it is just that present state which precludes them from raising the necessary capital at a reasonable rate.

Accordingly, while it is understood that the companies agree in principle to electrification, realising the many advantages which would accrue, enabling them to face road competition on more level terms, this question of finance is a very serious obstacle. It seems quite certain that State assistance will be required and the companies are naturally anxious to know how far this assistance will go, and what its implications will be.

At the recent N.U.R. Conference, Mr. C. T. Cramp, the general secretary of the Union, welcomed electrification on behalf of the employés, but took it for granted that if the State enabled the railways to find the money it would assume some sort of control of the system.

If some form of control is insisted upon another semi-public body of the Central Board type seems to be inevitable, but this is not the immediate concern of the electrical industry. What is important is that railway electrification would mean not only large orders for equipment for the conversion scheme, but also the lowering of the general price of electricity, a very forceful piece of propaganda for electrical methods, and a consequently expanded market for electrical appliances of all kinds.

While the national scheme is under consideration we must not forget the less ambitious suburban electrification schemes which are capable of more immediate realisation. The London and North Eastern Railway has a suburban system which should have been electrified many years ago. In fact, so to speak, it was made for electrification. The company has long had the matter "under consideration," but it was again stated in the House of Commons last week that it was not in a position to make definite proposals at present. At the same time certain of the daily newspapers published "details" of a scheme prepared by the L. & N.E.R. Company providing for the electrification of the greater part

of the old Great Eastern Railway (including the Liverpool Street lines) at a cost of £70,000,000. This was hailed as the first instalment of the general main-line electrification scheme.

Unfortunately our inquiries elicited the information that our contemporaries had been guilty of a gross exaggeration. Actually what the company has in contemplation is a scheme for the electrification of the lines in the immediate vicinity of Liverpool Street, but this is contingent upon the satisfactory outcome of the negotiations now in progress with regard to the London Passenger Transport Board.

The same company, however, has proceeded a little further with another scheme. It was announced in the House of Commons last week that plans had been submitted, for the purposes of financial assistance, for the electrification of some of the lines out of King's Cross.

There are thus definite signs that things are moving and we hope to be able to record substantial developments before long.

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**Electricity Generation**

THE Electricity Commissioners last week issued their annual "analyses and summaries of the returns of fuel consumption and units generated" for the year ended December 31st, 1930, and they are reviewed elsewhere in this issue. The popular features of interest are, of course, the highest thermal efficiency and the lowest fuel consumption attained among the steam stations, and the credit for both these achievements this time falls to the same station, Kearsley, of the Lancashire Electric Power Co., with 23.84 per cent. efficiency and 1.17 lb. per kWh generated fuel consumption. Last year the highest efficiency figure shown was 22.83 per cent., and while the average figures would probably be a truer indication of the trend of progress, an increase of 1.01 per cent. in nine months is a forcible answer to the critics who so keenly denounce efforts to advance efficiencies by "slight fractional increases." The decrease in the average fuel consumptions of the steam stations of 0.07 lb. per kWh generated clearly shows the advance that is being made in combustion control, more so because of the growing tendency in some parts to use the lower grades of fuel. It would probably not be wise to attach much importance to the increase of 0.02 lb. in the average fuel consumption for oil stations; it is very likely that the explanation is to be found in the general movement towards the utilisation of oil-engine stations for peak loads only. The case for the large steam station is well supported by the averages of the fuel consumptions, thermal efficiencies and load factors for the "selected" stations in the groups. These stations were taken purely for convenience, but the figures are probably more representative of the national position than would be averages from the whole returns. The progressive general increase in the load factors for all types and sizes of stations is very encouraging, particularly in view of the present industrial depression, and there is little doubt as to the reflection in the increase of the growing domestic load.

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**Carrier-current Protection**

No methods of protection have been yet evolved that are quite so efficient as the balanced system. For underground transmission, a pilot cable dropped into the same trench as the power cables adds very little to the cost, but with the development of overhead construction pilots have become a serious item of expense. If the auxiliary wires are run overhead, they reduce very considerably the length of span practicable; if laid underground along the route of the pole line the trench work is costly. Protective systems without pilots are in successful use in many instances, but where synchronous machinery is connected they are too slow in operation to be entirely reliable. The most promising of the substitutes for the pilot-operated relay is the carrier-wave method which, we understand, is to be applied to one section of the grid. Reports of its behaviour under operating conditions will be eagerly awaited.

**A New Ally**

ANY movement which is calculated to spread the electrical gospel is to be welcomed, whether it originates within the industry or outside it. Therefore we are pleased to receive some attractive pamphlets from the United Dominions Trust (Electric), Ltd., in which the benefits of electricity in the home and in industry are set forth in a convincing manner. Although in general character they resemble E.D.A. publications, they are quite original and—dare we say it?—brighter than some E.D.A. pamphlets which we have seen. Naturally these cannot be attributed merely to a desire on the part of the Trust to see the electrical industry expand. They are useful propaganda to this end, but they also invite attention to the Trust's hire-purchase financing services. It is intended that they shall be used by clients for circulating among their customers or "prospects" for the sale of wiring and appliances for the home or factory. They should play a useful part in the electrical "push."

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**Electric Ships**

IF ships can be judged by their "works," then the two liners which are being built by the Peninsula and Oriental Steam Navigation Co., Ltd., will be right up-to-date. The three-funnelled all-white hulls of the *Strathnaver* (launched in February) and the *Strathaird* (launched last week) are suggestive of gracefulness and speed not hitherto attempted in the case of ships trading between England and Australia. Moreover, instead of the steam reciprocators to which the company has adhered in the past, electric motors are to propel the new vessels. Thus, whether manœuvring in narrow seas or speeding across oceans, the whole process will be silent and with never a tremor of the ship's immense fabric. Six water-tube boilers burning oil will supply the turbo-alternators with steam at a working pressure of 400 lb. per sq. in. and a temperature of 725 deg. F., the steam being returned, after doing its work and being condensed, to the boilers by high-speed rotary pumps at a temperature of 350 deg. F. Such high steam pressures and temperatures make it practicable to run such ships as these with that economy of fuel which is needed to render their operation commercially possible. That a single boiler is capable of supplying sufficient steam to drive a 22,000-ton ship at 15 miles an hour says much for the efficiency of the Yarrow-B.T.H. machinery, to which brief reference is made on another page. On trial over a measured mile, each vessel's twin screws will exert 28,000 horse power and develop a speed of 26 miles an hour, while, should a propeller be lost, the remaining screw could exert sufficient thrust to drive the ship onwards at a speed of 19 miles. Moreover, with the ship running at the full-power trial speed of 26 miles an hour her turbo-electric machinery could, if necessary, be reversed in 30 seconds. The *Viceroy of India* is considered by her commander to be the "best steering ship" he has ever sailed in, and all three are as fully electric as any ship could be made, the "domestic" power plant of each being of 3,550 h.p. capacity.

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**Empire Standardisation**

A VERY happy result of the recommendations of the Imperial Conference regarding the co-ordination of all codes and specifications issued within the British Empire, referred to on another page of this number, is the close agreement which exists between the Australian and English engineering circles, and also the general desire in each of these countries to follow closely the recommendations of the other. For economical production agreement as to fundamental standardisation between the Home and the other countries is a necessity, and it is therefore strongly urged that efforts should be continued and reinforced to establish an equally keen spirit of co-operation between all parts of the Empire. The close working between the International Electrotechnical Commission and the British Engineering Standards Association suggests an even wider field for electrical standards work, but to dwell on that at the moment might bring forth an accusation of undue speculation, or perhaps political bias.

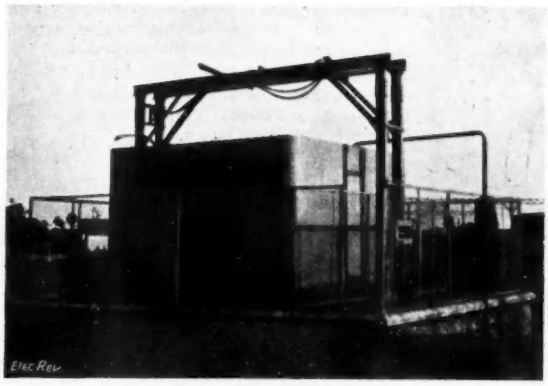
# Traction Sub-stations

## Successful automatic operation in India on the G.I.P. Railway has fully justified their adoption

By J. A. Colaco, B.Eng., A.M.I.E.E.

THE distribution system of the main-line electrification scheme of the G.I.P. Railway in Bombay easily constitutes a record for a single order for work of this kind placed with British electrical manufacturers. The equipment comprises 26 rotary-convertor sets of an aggregate capacity of 65,000 kW, together with the necessary a.c. and d.c. control gear for eleven sub-stations.* Only five of these sub-stations are attended, the other six being remote controlled from the former, but even in the attended sub-stations the sequence of operations in starting up and shutting down the convertor sets is carried out automatically.

The suburban section of the G.I.P. Railway terminates at Kalyan, 33 miles from Bombay, where the main line bifurcates into the south-east line, leading to Poona and the north-east to Igatpuri. A key sub-station located at Kalyan feeds both the suburban and the main-line sections in its immediate vicinity. It is, however, included among the suburban sub-stations. The main-line system comprises eleven sub-stations, of which the following seven are on the south-east main line,



The Regeneration Tank

*viz.*: Vangani (49), Karjat (62), Thakurvadi (71), Lonavla (79.5), Kamshet (90), Shelarvadi (104), and Kirkee (116), the figures in brackets denoting the distance in miles from Bombay. The sub-stations on the north-east line are located at Vasind (50), Thansit (62), Kasara (75), and Igatpuri (85). Vangani, Kirkee, Vasind, and Igatpuri are three-unit stations, while the remainder have only two units installed in each. The average interval between the sub-stations (which are located wherever possible in the proximity of existing railway stations) is about 12 miles, except in the Ghat mountain sections, where heavy loads are encountered.

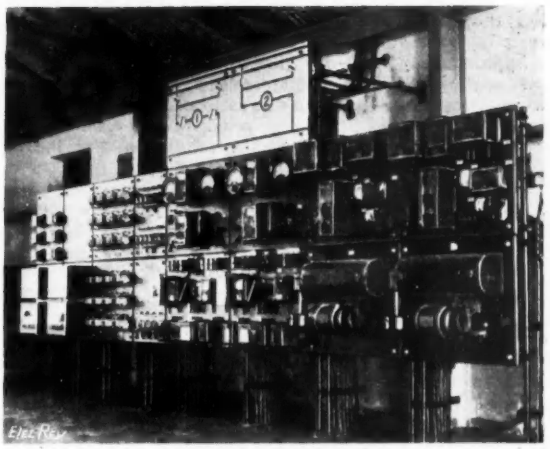
### Buildings and Plant

The sub-stations are steel-framed, but the walls are composed of local stone, while the roof, covered with Mangalore tiles, gives a pleasing appearance to the whole. This portion of the work, as well as the construction of the track sectioning and the lightning-arrestor cabins, was carried out to the instructions of the chief engineer's department.

Special precautions have been taken to prevent the ingress of vermin. The ventilation system had also to be carefully considered on account of the warm and humid atmosphere, and also because the unattended sub-stations have to be left closed most of the time. It is carried out as part of the ventilating scheme of the machines. Each rotary-convertor armature has a fan mounted on it, which is capable of supplying 10,000 cubic feet of air per minute. Air enters the basement through a filter, passes through the machines, and eventually escapes through louvres in the roof.

### The Out-door Sub-stations

All the sub-stations except Thakurvadi receive their power supply at 95 kV from the railway power house at Kalyan through duplicate high-voltage transmission lines. Owing to the difficulty of bringing the 95-kV line to it, the sub-station at Thakurvadi is supplied with power from Karjat sub-station at 22,000 volts through duplicate feeders, consisting partly of a transmission line carried on the track structures and partly of cable running alongside the track. The laying of this cable through tunnels and on the steep hillsides presented many difficulties.



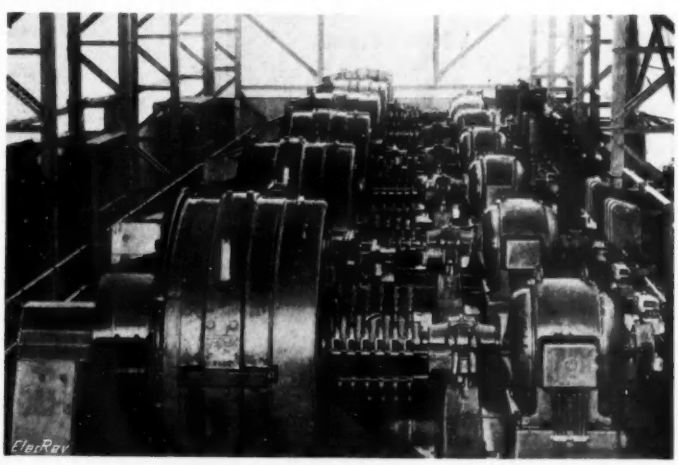
A Sub-station Control Board

The tee connections from the e.h.v. transmission system terminate on the steel structure of the outdoor sub-stations. The latter comprise the 110-kV oil circuit breakers, oxide-film lightning arrestors, and selector switches and their operating gear, and also the step-down rotary-convertor transformers. Each oil circuit breaker consists of three single-phase units, having circular tanks of boiler plate and operated by solenoid mechanism. The bushings are of the oil-filled type, which have a high impulse breakdown value, a useful feature in localities subject to lightning.

The selector switches are of the motor-driven, under-hung carriage type, all the live parts being kept below the top level of the steel structure, thus shielding them from the effects of lightning. The 110,000/526-V step-down transformers are each of 2,750-kVA capacity with double-wound secondaries to afford six-phase connection to the two armatures. They are self-cooled and are mounted on wheels, and can be run into the sub-station on a steel track for examination.

### Rotary Convertors

Each rotary-convertor set consists of two 750-V rotaries connected in series, and has a capacity of 2,500 kW—1,666 A at the continuous, 2,900 A at the one-hour rating, and a maximum of 6,000 A for short periods. The commutator is of the same diameter as the armature, and the discharge of air from the fan takes place axially across the commutator. Both features combine to prevent any tendency to flash-over under short-circuit conditions.



Remote-controlled Sub-station

The machines are solidly connected to the negative bus-bar, the high-speed breaker being installed on the positive side. The machine breaker has a nominal rating of 2,000 A, while that of the feeder circuits is 1,000 A. Each d.c. unit consists of a wheeled carriage carrying a high-speed breaker and the contact plugs for connecting the units to the machine or feeder circuits. The unit is plugged into an open-fronted cubicle built up of steel plate up to the level of the breaker

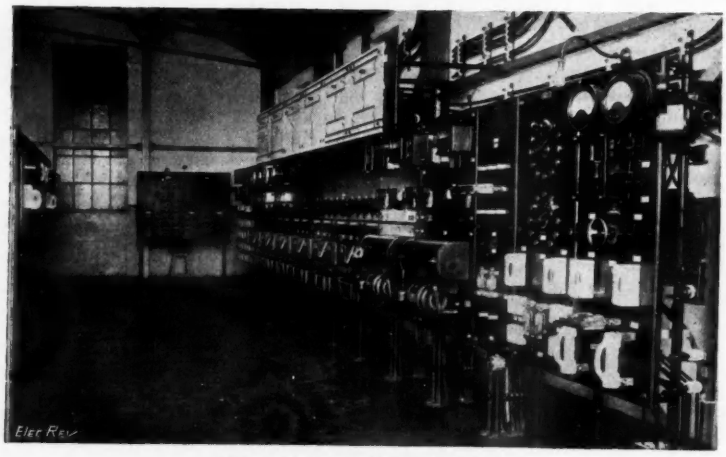
* ELECTRICAL REVIEW, November 22nd, 1929.

arc chute, and of "sindanyo" above this level. The operating panels are mounted on the front of the truck units.

Approximately half-way between the sub-stations are track-sectioning cabins, containing four high-speed breakers which interconnect the tracks so as to make the best possible use of the track-copper conductivity. Each cabin is controlled from an adjacent attended sub-station, but the h.s. breakers are arranged for automatic reclosing. Close to the track outside each sub-station is a small cabin containing lightning arrestors of the aluminium-cell type for the protection of the sub-station d.c. equipment.

## Supervisory Control

The controlling apparatus consists essentially of a mimic diagram of the sub-station and track-section cabins under control. On this diagram the various switches and connected apparatus to be controlled are represented by two keys, together with red and green indicating lamps. Rotation of either key sends along the pilot wires a train of positive and negative impulses to a definite code which is peculiar to that key only. The controlled stations are provided with a number of selectors corresponding to the circuits controlled. The coded train of impulses is received by all the relays in parallel, and these relays notch up, but only that one which pertains to the code selected completes its movement, and thus operates the selected piece of apparatus through the medium of additional relays or contactors.



**Control Room at Karjat Sub-station**

The control is carried out by three pilot wires run on brackets on the overhead structures. On completion of an operation, a series of motor-driven keys at the unattended sub-station transmits a coded train of impulses, which are picked up by the appropriate selector at the controlling sub-station, lighting the red or green lamps and giving a back indication to the operator.

## A Novel Feature

The electric freight locomotives on this railway system are equipped for regenerative braking; hence a considerable amount of regenerated energy is returned to the line by heavy freight trains descending the Ghats. Although there is usually more than enough load on the system to absorb the recuperated energy, provision has been made to absorb any momentary excess of this energy. When the frequency of the system has risen by three per cent. above the normal of 50 cycles, a relay causes a high-speed breaker to close, thereby throwing on to the system an artificial load consisting of a tank at Karjat sub-station containing salt solution with adjustable electrodes. The capacity of the tank is 1,333 amperes at 1,500 volts or 2,000 kilo-watts dissipating power. The device has successfully operated under service conditions.

## Erection of Material

Orders for the material were placed with the British Thomson-Houston Co., Ltd., early in the year 1927; erection on site was begun in July, 1928, and by April, 1930, the last sub-station, *viz.*, Igatpuri, had been completed and handed over to the railway. In view of the magnitude of the contract and the area over which the work was spread, the above performance is very creditable to all concerned. The erecting staff consisted of a chief engineer and three senior and two European junior assistant engineers. The other supervising staff, wiremen, labourers, &c., were locally engaged. The maximum number of workpeople engaged at one time was approximately 530. The standard of workmanship of the local staff has given complete satisfaction in this, as well as in other sections, of the electrification scheme. Constant supervision was, however, necessary to ensure the maintenance of a uniform standard of workmanship and rate of progress.

The transport of the material did not present the difficulties which were anticipated, due mainly to the excellent organisation of the scheme and to the facilities provided by the railway authorities. During the three to four months of the monsoon period, however, outdoor work was practically impossible, and transport conditions rather difficult. Little trouble was experienced from vermin, except at Thakurvadi, where some good-sized rats found their way into the building due to carelessness of the watchman, but succeeded in doing more damage to themselves than to any part of the equipment.

## Operation

The distribution systems of the G.I.P. suburban and main-line schemes are worked under the control of the traction engineer (distribution), who has three assistants, one each for the suburban, the south-east, and the north-east districts. The foremen, inspectors, and sub-station attendants, who have had considerable experience in similar work in India were locally engaged. These had opportunities of assisting the erecting staff during the construction and the initial running-in period, an experience which stands them in good stead in carrying out their present duties. A considerable number of the local erection staff were also absorbed by the railway as opportunity arose.

In order to ensure reliable service, arrangements have been made to operate every part of the equipment throughout the sub-stations at least once a day. Any faults which may occur are consequently located and rectified within twenty-four hours.

The switching operations on the entire distribution system are carried out under the instructions of the power controller. Telephonic communication with the latter is available at each sub-station by means of a special "traction" telephone. In the early days of the suburban electrification, the inevitable crow used to cause trouble on the overhead system, but the modifications to the insulators have outwitted him. On rare occasions accidents occur to the overhead equipment causing "dead" short-circuits, but even at these times the equipment takes care of the trouble and the railway staff is able to restore normal conditions expeditiously.

## Justification of System

The extra cost involved in providing the automatic equipment is usually justified by the saving in operators' wages and by the more efficient operation of the sub-station machinery due to the virtual elimination of the human factor, besides other local advantages. As only six of the eleven sub-stations are at present unattended, the fullest advantage could not be taken, due to local considerations, of the possible economy in operators' wages, but as the sequence of operations in starting up and shutting down of every part of the plant is automatic, the second great advantage, *viz.*, the almost entire elimination of the personal factor, has been secured. The efficient and reliable operation of these sub-stations under the exacting conditions of traction service is the main justification of the adoption of this system on an important strategic railway leading from and to the "Gateway of India." It may be mentioned here that a supervisory system of three sub-stations is also in successful operation on the B.B. & C.I. Railways' suburban scheme. On the most recent suburban scheme at Madras on the South Indian Railway where two 1,500-V rectifier sub-stations are installed, both stations are controlled from the one at Egmore. Moreover, the Bombay Electric Supply and Tramways Co., Ltd., in a development scheme of some magnitude, is installing automatic plant in a number of sub-stations in Bombay. The material for these has been supplied by the Metropolitan-Vickers Electrical Co., Ltd., and the erection is being carried out by the supply company's staff.

Acknowledgments are due to the British Thomson-Houston Co., Ltd., for permission to use the photographs and for certain information relative to the above article. The entire electrification scheme was carried out to the specifications of Messrs. Merz & Partners, consulting engineers to the Indian Railway Board.

Sidings have been provided for the conveyance of plant up to the sub-stations where cranes of requisite capacities are installed for handling the material. In designing the sub-station buildings, special care was taken to ensure that the external appearances in each case harmonised with the surroundings.

# Coal Testing. By A. B. Owles, A.I.C.

## Every power station should have a well-equipped chemical laboratory under the control of experienced chemists for the sampling and preparation of fuel for analysis and the determination of its average calorific value

THE sampling and testing of coal has become an established practice in large power stations. The present position is that a B.E.S.A. Committee, of which I am privileged to be a member, has been working on the problem for over two years, and the Association has recently issued two important booklets, namely, "The Sampling and Analysis of Coal for Export" and a "Report by Dr. E. S. Grumell and Dr. A. C. Dunningham on the Sampling of Small Coal up to Three Inches in Size." A British Standard Specification for inland purposes (B.S.S. No. 420—1931), applicable to power-station sampling, is now available, and this bears a close resemblance to the "Export" booklet.

Before commenting upon some of the salient features of these publications, the question of ash content should be considered. The following interesting figures relate to a number of unscreened coals, up to a maximum size of 2 inches, and cover a period of five years; they have been picked out at random, and are the result of averaging weekly samples. The undertaking with which I am associated consumes approximately 300,000 tons of fuel per annum, derived from about 30 different collieries.

PERCENTAGE ASH CONTENT OF FUELS

| Year | "A" | "B" | "C" | "D" | "E" | "F" | "G" |
|---|---|---|---|---|---|---|---|
| 1926 | 10.71 | 10.84 | 15.12 | 20.54 | 13.48 | 16.01 | 15.37 |
| 1927 | 10.55 | 10.86 | 16.59 | 21.56 | 12.30 | 12.37 | 14.88 |
| 1928 | 10.26 | 10.79 | 14.13 | 19.33 | 11.00 | 12.52 | 15.81 |
| 1929 | 10.71 | 11.04 | 12.61 | 19.37 | 11.43 | 11.80 | 14.09 |
| 1930 | 10.65 | 11.85 | 13.35 | 18.21 | 12.30 | 12.18 | 14.43 |

These figures appear to show that, generally speaking, individual fuels do not vary to any marked extent over long periods. Example "F" shows the improvement brought about by installing a modern screening plant at the colliery; prior to 1926 the ash content was invariably more than 16 per cent.

### "Average Error"

It must not be inferred from the figures given above that there is no degree of variation from week to week. The B.E.S.A. report referred to shows, from a large number of tests, that each fuel possesses a certain characteristic variation in its ash content. This has been called the "average error," and it represents the average amount by which the percentage of ash in any individual sample or wagon differs from the average ash of the consignment sampled.

By the study of results obtained from numerous routine tests carried out on different fuels, Drs. Grumell and Dunningham have evolved a system of sampling which possesses some rather unusual features, and, furthermore, places the problem of sampling—which has been the cause of so much controversy—on a sound scientific basis. Their report concludes with a schedule of "Independent Confirmatory Evidence," which has been obtained from members of the B.E.S.A. Sampling Committee. The main points in this system are—

(1) The weight of the gross sample is determined by two factors: (*a*) the ash content, and (*b*) the size of fuel.
(2) The weight of the gross sample is independent of the weight of the gross consignment, *i.e.*, whether this be 100 or 1,000 tons of fuel.
(3) The sample should be taken by a stated number of increments, evenly distributed over the whole consignment.

With regard to (3), the number of increments is determined by the average error of the fuel, and further, it is considered preferable to take a large number of small increments rather than a small number of large ones.

### Theory of Size-weight Ratio

The average error really expresses the lack of uniformity in the distribution of the ash in the fuel, and this having been duly considered in the drawing of the sample, it is possible to apply the so-called "theory of size-weight ratio." This determines the minimum weight of gross sample that can be dealt with for a given size of fuel in order to keep within a certain accuracy, usually of plus or minus 1 per cent.

The size-weight ratio is defined as the average weight of the largest piece of shale to the weight of the sample, *e.g.*, a one-inch slack containing pieces of shale up to 0.25 lb. should not be below 50 lb., since an error of 0.5 per cent. would be incurred by the chance inclusion or exclusion of a piece of shale. Analytical errors can be responsible for an additional 0.5 per cent., making a possible total error of not more than 1 per cent.

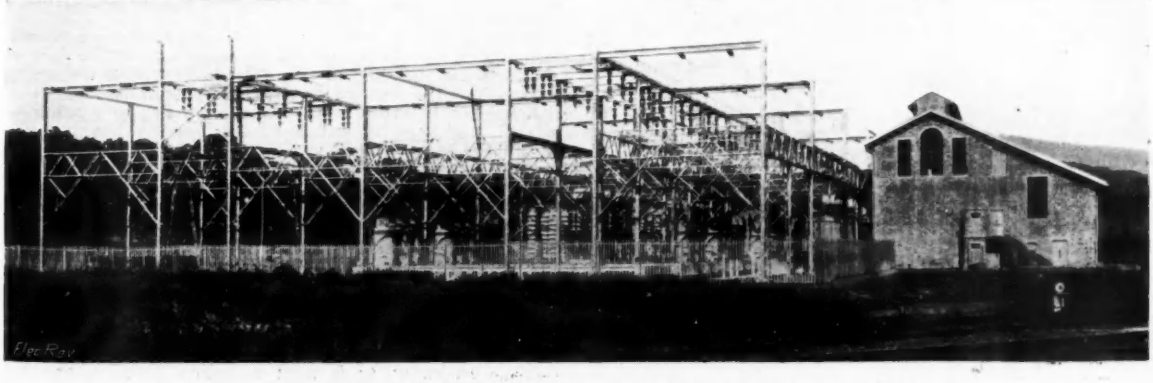
The specification stresses the importance of this ratio, not only in connection with the uncrushed sample, but also in each stage of its reduction and sub-division preparatory to analysis.

Hence the advent of this work, it is hoped, will make it possible to sample a fuel to almost any desired degree of accuracy, given the requisite conditions, so that while it is possible to sample a coal to, within, say, one-half of 1 per cent., it is not usually commercially possible, or even desirable, except in special cases, owing to the large bulks involved. It is important to note that the quantities shown in the B.S. Specification have been arrived at after allowing for a safety factor of two, in order to facilitate an even distribution of the increments over the whole consignment. It is therefore probable that at some future date this may be amended.

### Practicable Limits of Accuracy

The question arises as to how this Specification is to be applied in power-station practice. To consider this, one must bear in mind the main objective, namely, to obtain an *average* weekly calorific value of the whole of the fuel consumed to within the usual plus or minus 1 per cent. However, it is not necessary to have each individual sample of fuel correct to this degree, particularly where the weekly fuel make-up consists of a large number of different coals. Hence, it is not so much that we have to apply the Specification rigidly to each sample, but rather that the principles underlying the methods recommended should be adopted. This should be thoroughly understood, otherwise unnecessary expense and time may be involved.

Sampling conditions in a power station may render it difficult to draw evenly-distributed increments from the total fuel consumed, but as an alternative each coal can be dealt with separately. This is done by taking a number of relatively small samples over a period, and treating the aggregate to obtain the average analysis. A calorific value accurate to the desired limit can then be obtained by calculation from the respective tonnages and calorific values of the various fuels. When considering the weekly fuel as a whole, it should be borne in mind that this may be made up of a number of



**General View of Automatic Sub-station at Karjat in India** (*see page* 123)

D

fuels in varying amounts, and that it is not so important to have representative data in the case of the minor quantities as in that of major deliveries; hence, in order to take this factor into consideration, it is necessary to secure more samples in the latter case. In the aggregate these samples may actually be greater in bulk than the figures recommended in the Specification, and the positive and negative errors involved will largely cancel out. That this is true has been proved in the undertaking with which I am associated, where sampling trials involving the use of at least five samplers have been carried out, and yet, after handling such enormous amounts of fuel, the average calorific value came out within 1 per cent. of that determined in the manner indicated above. If the accuracy of sampling of any particular fuel is required within 1 per cent., then there appears to be no alternative but to adopt the amounts recommended in the Specification, which, of course, means some additional cost.

### Fuel Analysis

Accurate analysis must be coincident with careful sampling. A full account of the methods recommended has been drawn up in the B.S.S. No. 404—1930, a pamphlet dealing with coal sampling. Comments on the main points in the various estimations that have been met with during extensive experience in this subject are enumerated below.

MOISTURE.—This determination is a very important phase of the work, particularly in the case of washed coals, as it is quite frequently the subject of complaint. In the first place, the moisture content of certain washed slacks is apt to vary in the wagon, and a difference of 4½ per cent. has been observed between the top and bottom layers; thus, it is necessary to take special precautions when sampling fuels of this type. Errors can occur in the crushing of the coal, and in this connection it has been found that grinding the coal by abrasive action in a mill results in some loss of moisture, so that crushing by impact appears to be preferable.

The more recent methods of estimating moisture in coal involve actual distillation of the water into a special graduated receiver, from which the moisture percentage can be ultimately read off. The advantage of this is the elimination of any doubt about interference from oxidation.

VOLATILE MATTER.—It is important that this test should be done under strictly comparative conditions. Speaking generally, the type of coke produced during the test is a useful guide as to the behaviour of the fuel on stoker grates.

ASH.—The necessity of cooling off in a desiccator cannot be too strongly emphasised, and periodic changing of the hygroscopic agent is desirable. Errors from this source can frequently be quite appreciable.

The fusion point of the ash should be determined where possible, care being taken to eliminate those fuels with ashes of a comparatively low fusion temperature, since excessive trouble from clinkering may result on the grates of modern high-duty boilers. The "Brayshaw" fuel ash testing furnace, as used by H.M. fuel research station, is to be recommended for this class of work. An analysis of the ash is useful in the choice of suitable refractories for lining the furnace.

CALORIFIC VALUE.—The standard instrument for this determination is the "bomb" calorimeter of the Berthelot type, which employs compressed oxygen. There are other calorimeters which are useful for routine work, but they should preferably be standardised against the bomb type. Care should be exercised as to the source of oxygen, as that made from the electrolytic process may contain small amounts of hydrogen. Some oxygen tested by the author was found to contain this impurity, which increased the apparent calorific value to the extent of 2 per cent. Since the sulphur content of the fuel can vary, and may reach appreciable proportions, it is necessary to estimate it and allow accordingly.

The determination of the calorific value should be carried out on the air-dried sample, as coal dried in an oven tends to give results which are too low, probably as a result of slight oxidation.

The suggestion has often been made that coals should be bought on a heat-unit basis, but my own experience is that this is unnecessary, particularly as complaints about the quality of the fuel are not now so numerous as in the past.

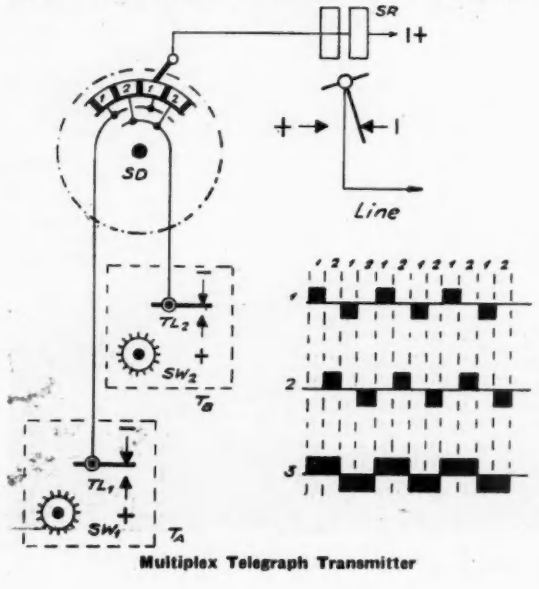
It is to be hoped that, since reliable methods of sampling and analysis are now available, electricity supply undertakings will use them, so that the overall efficiency of each station may then be more truly comparative.

# Multiplex Telegraphy

THERE are several methods by means of which a single-line wire, or radio circuit, can be made to furnish a number of channels for telegraphy. Each has, however, quite well-known peculiarities and limitations.

The system devised by the Automatic Telephone Manufacturing Co., Ltd., which was demonstrated in London last week, utilises Morse signals and is capable of operating over long land lines at the maximum speed which any particular line will permit. For descriptive purposes a two-channel system will be assumed, though the method is not, of course, limited to that number.

The transmitter driving motor is an ordinary shunt-wound d.c. machine of the commercial fractional-h.p. type, and is coupled to a driving shaft through a Doignon governor, which maintains the shaft speed absolutely constant, even with an input voltage variation of ± 25 per cent., so that the equipment may be mains driven. The main shaft drives a distributor directly and, through gearing, it also drives the two transmitters, so that they are in phase with one another and have the correct phase relationship with their appropriate segments on the distributor. The accompanying diagram shows the electrical and mechanical relationship between the two transmitters and the distributor. The two star wheels $SW_1$ and $SW_2$, are so geared to the main shaft that if the two transmitter levers were connected to independent lines they would send out identical reversals simultaneously. When connected to alternate segments of the distributor, as shown in the sketch, the first portion only of the marking and spacing pulses of transmitter TA are effective in controlling the sending relay SR, the second half of the pulses being suppressed as the brush is wiping over one of the groups of segments marked 2 and connected to lever TL of transmitter TB. The first portion of the marking and spacing portions of the pulses from TB will be suppressed and their second portions will act on the sending relay SR. The operation of the two transmitters is shown by lines 1 and 2 of the inset. The two sets of signals act alternately on the sending relay SR which transmits to the line their resultant as shown at line 3 of the inset, which consists of reversals such as would be sent out by either transmitter if connected directly to the line circuit without the intervention of the distributor.



Multiplex Telegraph Transmitter

At the receiving end a line relay receives the complex signal currents which, by means of a receiving distributor, are analysed into the two groups of signals and recorded by their appropriate receivers. The receiving distributor is maintained in synchronism with that at the sending end of the line by the Doignon centrifugal friction governor, which differs from all others in that instead of producing variable artificial load to balance fluctuations imposed by the driven apparatus, it automatically furnishes the necessary driving power to obtain constant speed of the distributor.

When the whole system is in rotation, centrifugal force is balanced by springs, the pressure exerted by friction pads on a cone being that due to the difference between the spring tension and the centrifugal force due to rotation.

Hence any tendency to increase speed, either by a reduction of load or increase in voltage on the motor, is automatically neutralised by an increase in slip.

There is no physical movement of the governor arms and, therefore, no hunting. The moving system can be adjusted to the correct speed while running by moving a crosshead.

Line, speed-indicating, and correcting segments are mounted on a common disk, which is rotated, and a brush carriage (normally stationary) is shifted backwards or forwards by the correction pulses. The Morse system being an unequal letter code, it is not possible to use special correcting segments as in the Baudot and five-unit systems, and correction is generated from the received signals themselves.

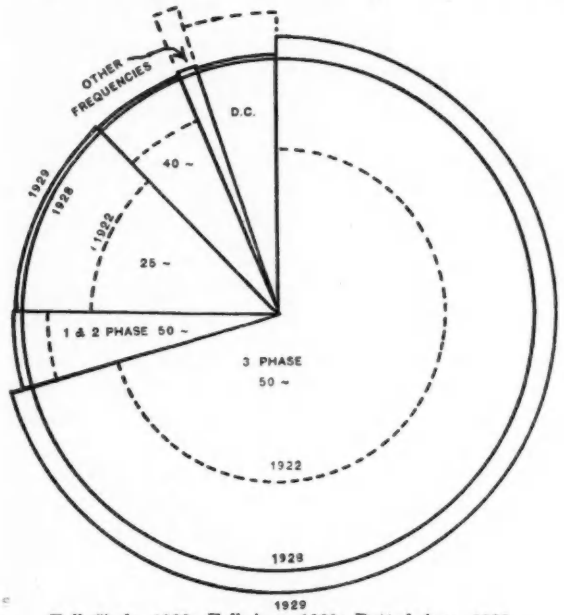
Electro-mechanical gear adjusts the position of the brush carriage backward or forward according as the correcting relays are operated by the generated correcting pulses.

# Ten Years of Electricity Supply. By D. J. Bolton

## The great increase in the proportion of the domestic load to the total is a striking feature*

THE recently-issued return of electricity supply statistics is the seventh of its kind to be published, the seven volumes covering a total period of ten years terminating December 31st, 1929 (companies), and March to May, 1930 (local authorities). Taken together they present a detailed picture of a decade of public electricity supply in this country, a picture which only needs the figures of individually-owned stations to make it absolutely complete. Ten years may not seem a long period in the life of an industry, but it is long enough to give a fair idea of progress and tendencies.

The present article aims in the first place at showing the latest changes recorded under a few of the more important heads. This change will be illustrated by reference not only




Full Circle, 1928; Full Arcs, 1929; Dotted Arcs, 1922.

**Fig. 1.—Generating Plant Installed**

to the immediately preceding year, but also to the average for the whole decade. No attempt will be made to reproduce the actual figures themselves, since few people can get much information from a string of numbers representing millions of kWh, kW, tons of coal, &c. Moreover, those who can do so are usually specialists and go direct to the return.

| Item. | Change from preceding year. | Mean annual change in all previous years. |
|---|---|---|
| | % | % |
| 1. Installed capacity ... | Increase of 13.8 | +11.4 |
| 2. Aggregate maximum load | Increase of 6.9 | + 9.6 |
| 3. Excess plant (items $\frac{1.2}{2}$) | 83 from 72 | (Average 66) |
| 4. Total kWh generated ... | Increase of 11.5 | +10.6 |
| 5. Mean load factor ... | 33 from 31½ | (Average 29.5) |
| 6. Fuel consumed per kWh | Decrease of 3.4 | − 6.2 |
| 7. KWh sold (lighting and domestic) ... | Increase of 15.1 | +17.5 |
| 8. Revenue from ditto ... | Increase of 8.1 | + 8.3 |
| 9. KWh sold (power) ... | Increase of 9.8 | + 9.7 |
| 10. Revenue from ditto ... | Increase of 4.5 | + 2.1 |
| 11. Mean price per kWh ... | Decrease of 4.2 | − 7.2 |
| 12. Surplus of receipts over expenses (per cent. of capital expenditure) | This year 7.7 | Previous years 8.6 |

Above are listed twelve of the more outstanding items for which figures are given in the Return. In the second column is given the percentage change from the previous year, whilst in the third column is given the average annual percentage change for all the previous years published. This last figure is not the total change divided by the total period, but is obtained by taking each year's percentage change and then averaging these percentages. It is therefore a relevant comparison with the percentage in the previous column.

Taking the first three items tabulated, it will be seen that installed capacity and maximum load on generating stations have both increased, the former somewhat more and the latter somewhat less than the mean of the percentage increases registered in previous years. (It must, of course, be realised that in order to maintain the same *percentage* increase, the rate of growth would have to be a geometric one.) Comparing items 1 and 2, the important point stands out that the installed capacity still continues to increase at a faster rate than the maximum load on the stations. In fact, the plant installed at the end of the period under review was

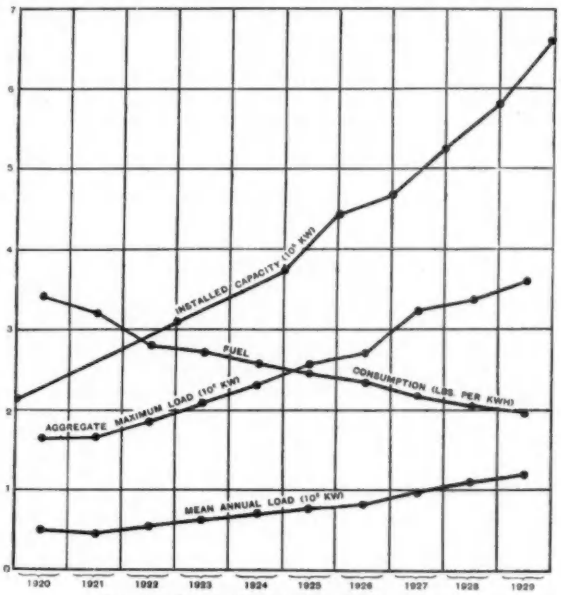



**Fig. 2.—Generating Station Performance**

actually 83 per cent. in excess of the maximum load it was called upon to handle. (The average for all previous years was 66 per cent.) Before long we may look for some return on the capital expended on interconnection lines in the shape of a reduction in this very ample "safety" margin. It should, however, be stated in explanation of the jump occurring in this particular year that nearly half the increase is accounted for by the coming into operation of six capital stations commissioned in previous years.

The total kWh generated (item 4), which may fairly be

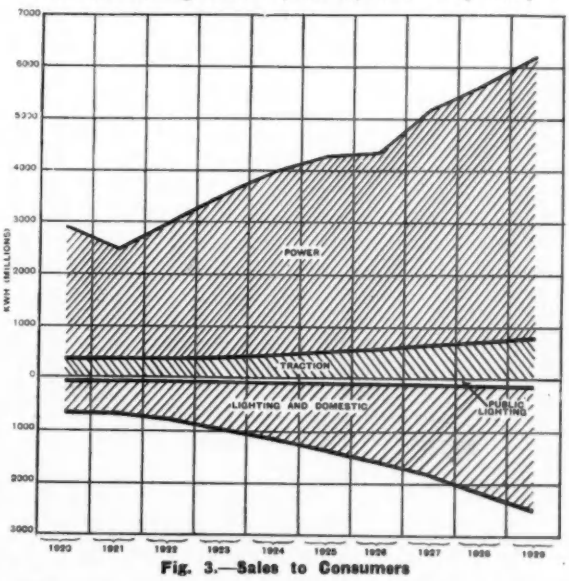



**Fig. 3.—Sales to Consumers**

regarded as the "pulse" of the whole electric supply body, more than maintained its annual 10 per cent. increase. The next item also is encouraging, namely, the mean load factor on the generating stations of authorised undertakers. This remained steady at rather under 30 per cent. for seven or eight years, the average up to 1927 being exactly 29 per cent., but the last two Returns have shown this increasing to 31½ per cent. and 33 per cent., respectively. Perhaps this

* Electricity Commission Return of Engineering and Financial Statistics. ELEC. REV., June 19th and 26th, 1931.

may prove the beginning of a steady upward rise fostered by developments in electric heating and other off-peak loads. The fuel consumed per kWh generated dropped again (item 6), but this time by only a small percentage.

The two main groups of consumers—lighting and power—show increases of consumption which are fairly similar to their averages for all the previous years (items 7 and 9). Owing to the decreasing prices charged, the percentage increases in revenue from the two groups are about half as much in each case as the increases in output. The mean price reduction on all the kWh sold was only about 4 per cent., which does not seem excessive, but it will be noted that the final surplus of receipts over working expenses only totalled 7.7 per cent. of the capital expenditure as against 8.6 per cent. average in previous years (item 12). This surplus is all that is available for paying the whole of the capital charges, including depreciation.

In general, it will be seen that, although the figures for growth in output, &c., are encouraging, the margin of financial return is a narrow one. With coal, wages, taxation, &c., at their present levels, and with trade in such a state that increased energy prices are out of the question, the only prospects for a better financial result lie in a substantial increase in load without a proportionate increase in equipment, and therefore fixed charges.

The accompanying diagrams are designed to illustrate graphically a number of the changes outlined above. They follow the same order as in the table, starting with the generating station equipment and working through loads, sales, and prices to the financial conclusions. In fig. 1 the areas represent the installed capacity of generating plant in the stations of authorised undertakers. The full-line circle represents that existing at the end of 1928, and this is divided up radially to show the a.c. gear of various frequencies and the d.c. The full-line arcs represent the totals for a year later, so that the various annular strips show the increase during the year under review. The dotted arcs represent the same totals six years previously, *i.e.*, at the end of 1922. Taking the last year, it will be seen that the standard system showed the largest increase, both actual and proportional, although there were slight additions to each of the other groups. Counting all the 50-period systems, these represent almost exactly three-quarters of the whole, and the actual kW added to this group during the last year equalled one-half of the total existing non-standard capacity existing in 1928. Taking the change since 1922, it will be seen that the d.c. and " other frequencies " groups have lessened in size, all the others showing substantial increases. It is unfortunate that so many 25- and 40-period alternators should have been put down, there having been an actual addition of 400,000 kW in the six years.

Fig. 2 illustrates the mean performance of the generating stations over the ten years covered by the Returns. The three rising curves refer to installed capacity, maximum load, and mean annual load, all to the same scale. Their ratios, therefore, give the plant factor and the load factor. Actual values are shown by dots, and it will be noted that, whereas the installed capacity figures refer to the ends of the annual periods, the other values refer to the middles. The falling curve plots coal consumption per kWh.

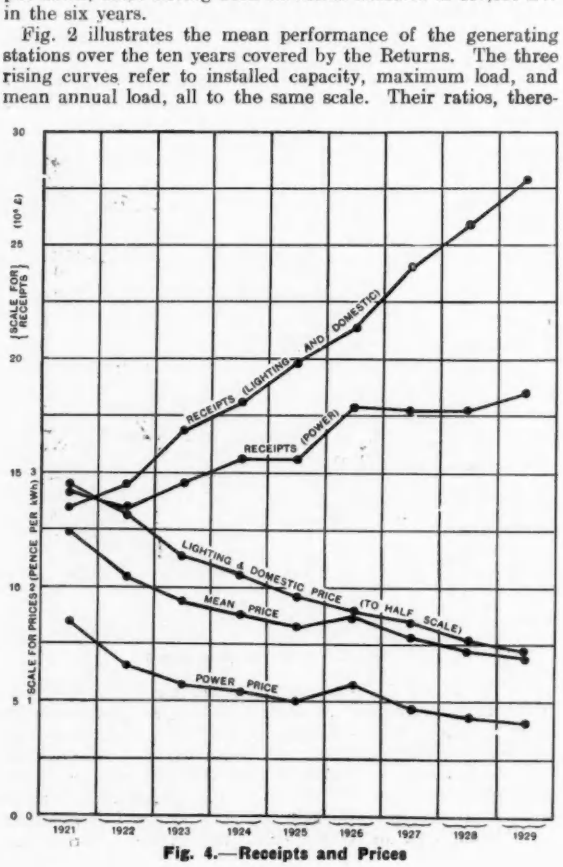
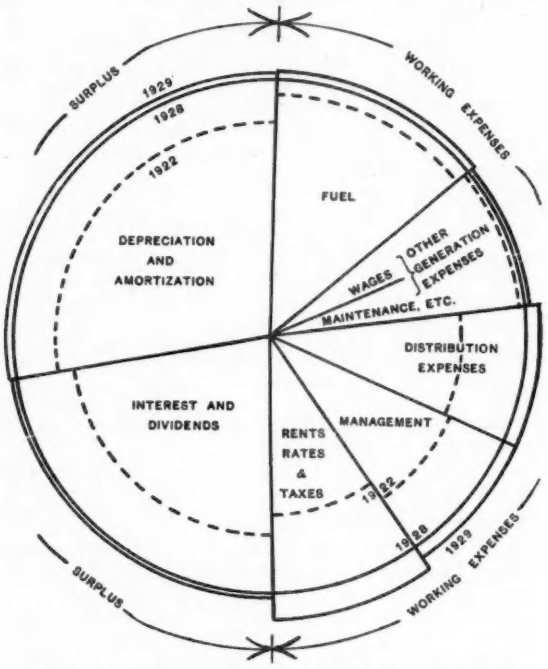



**Fig. 4.—Receipts and Prices**

Fig. 3 represents the sales of energy to the four groups of consumers, omitting all sales in bulk. Consumptions are represented by the widths of the shaded belts, traction and power being plotted above the horizontal zero line, whilst lighting and domestic are plotted below. This arrangement avoids the deceptive appearance which often results when a number of varying widths are built up one above the other. The growth of the lighting and domestic groups has been both smoother and (proportionally) more rapid than that of the power groups, and it will be found that, whereas in 1920 the former was 22 per cent. of the latter, in 1929 the proportion was 40 per cent.




Full Circle, 1928; Full Arcs, 1929; Dotted Arcs, 1922

**Fig. 5.—Disposition of Receipts**

The next diagram (fig. 4) deals with the money results of these sales. The two upper and rising curves plot receipts from the two main groups—lighting and domestic, and power. Starting from the time (in 1921) when the power group actually contributed a greater share of the income, the point has now been reached at which the lighting and domestic group brings in half as much again as the power group. The three falling curves plot prices per kWh for lighting and domestic, power, and the mean. (The lighting curve is to half the scale of the other two.)

The last diagram (fig. 5) shows the final results of the year's working in £ s. d. The area of the full-line circle represents total receipts from the sale of energy to consumers in 1928. (Both the cost of, and the receipts from, the bulk sales are omitted from this figure.) This total area is divided up radially, so as to show the destination of these receipts.

Approximately half the total is absorbed in working expenses (right-hand side), whilst the other half is the surplus available to meet capital charges. The right-hand semi-circle is further divided into fuel and other generation expenses, distribution, rates, &c. Of these it is the generation expenses which have grown least, whilst the management, distribution, and rates portions have grown most.

Taking the left-hand side of the diagram, this covers interest, depreciation, and other financial items. It is divided up into two portions representing, respectively, the sums distributed in interest, &c., and the sums paid off or put by for depreciation.

Taking undertakings as a whole, the former group, *i.e.*, the amounts distributed, still account for rather less than half the total surplus; but, in order to give a correct picture of what is happening here, it would be necessary to show separately the results of the company undertakings and those of public authorities, since the former distribute much more of their surplus than do the latter. Thus, in the last year covered, the companies saved in the form of depreciation reserves, &c., 47 per cent. of their net surplus, whilst the public authority undertakings put by 62 per cent. of theirs.

# Potentiometer Control. By W. Norburn, A.M.I.E.E.

## As affecting the torque and speed of direct-current motors

IN a previous article* a method was given of arriving at the relationship between the speed of rotation and the current in the armature of a hoist motor when lowering a load under potentiometer control. It is now possible to examine the effect of variation of torque on the speed, having regard to the resistance in series and parallel values. For this purpose it is proposed to consider a 26-h.p. 220-V winch motor having a full-load (hoisting) speed of 620 r.p.m. with a limiting light-load speed of 1,600 r.p.m.

This machine is designed to the following leading particulars :—

Armature Core.—12.0 in. diameter by 7.0 in. length, wave wound; 37 slots, 111 commutator segments, 12 wires per slot; resistance, hot, 0.0858 ohm.

Main Poles.—Four; series winding, 29 turns on each coil, all in series; resistance, hot, 0.0393 ohm. Shunt winding, 1,600 turns on each coil, all in series; resistance, hot, 312 ohms.

Inter-poles.—Four, all in series; resistance, hot, 0.0461 ohm.

Full-load Armature Current.—102 amperes.

Torque for 26 h.p. at 620 r.p.m. $= 26 \times 5{,}252 \div 620 = 220$ lb.-ft. (1)

Expressing the torque in terms of armature current and flux per pole, we have—

$$\text{Torque} = K \times \text{flux} \times \text{amperes}.$$

$$220 = K \times 2.2 \times 10^6 \times 102.$$

$$K = 220/(2.2 \times 10^6 \times 102).$$

$$= .981 \times 10^6 \quad \ldots\ldots(2)$$

$$\text{Also r.p.m.} = \frac{E.g.}{\text{Flux}} \times \frac{10^4}{14.8} \quad \ldots\ldots(3)$$

Assuming the controlling resistance has a value of 2.0 ohms value, and the brush drop is 1.8 volts (total), the current value is $218.2 \div 2.17 = 101.5$ amperes, when used under normal hoisting conditions.

The procedure is as follows: Assuming that connection is made to the point giving 1.4 ohms in series, and that the remaining 0.6 ohm, plus the series winding, is in parallel with the armature. When the potential drop across the series resistance is, say, 130 volts, these conditions exist :—

Current in series resistance $= 130 \div 1.4 = 92.9$ amperes ……(4)

Potential drop across resistance in parallel $= 220 - 130 = 90$ volts.

$\therefore$ Current in series coils and resistance in parallel $= 90 \div (0.6 + .0393) = 140.9$ ……(5)

Current in armature $= 140.9 - 92.9 = 48$ ……(6)

Loss in volts through armature $= 1.8 + 48\ (.0461 + .0858) = 8.2$.

$\therefore E.g. = 90 + 8.2 = 98.2$ volts ……(7)

* ELECTRICAL REVIEW, April 3rd, 1931 (page 581).

To obtain the speed and torque it is necessary to determine the flux. The ampere turns per pole pair is—

(*a*) Series $= 58 \times 140.9 = 8{,}150$

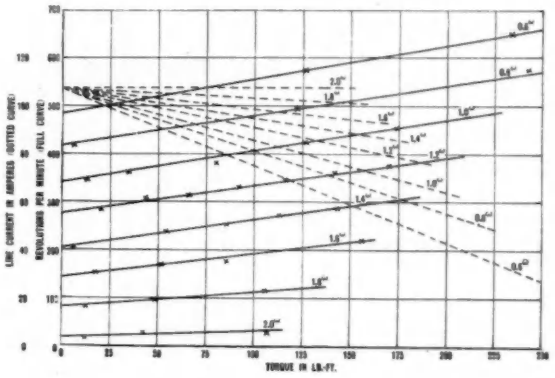
(*b*) Shunt $= 3{,}200 \times \frac{130}{312} = 1{,}330$

Total ... $= 9{,}480$

From the magnetisation curve, allowing for an armature current of 48 amperes, this produces a flux per pole of $2.45 \times 10^6$ lines.

Then $\text{r.p.m} = \frac{98.2}{2.45 \times 10^6} \times \frac{10^4}{14.8} = 271$ ……(8)

and torque $= .981 \times 10^{-6} \times 2.45 \times 10^6 \times 48 = 115$ lb.-ft. ……(9)




By assuming other voltages across the resistance in series, the results so obtained may be plotted for the value 1.4 ohms; and the method being continued for other values of resistance, the series of curves applicable to the machine may also be plotted.

It should be noted that where a negative value is obtained for the armature current, motoring is taking place, and the load is being *driven* downwards.

In the above curves the full lines show the speed for values of torque with definite values of series resistance, and the dotted lines are the corresponding line current values. These curves clearly demonstrate the property previously claimed for this method of connecting the series and shunt coils, *i.e.*, the equivalent of a regenerative effect is obtained, increasing with higher speeds and torques.

# Super-grip

## A Reliable Method of Holding Tool-bars for Heavy Lathe Work

TURNERS on the heaviest of lathe work (sliding or facing) realise the need for an unyielding grip for their tool bars, and more especially does such need arise when the cutting operations are intermittent as well as heavy.

The design—used by the writer—is represented in the ad joining sketch, and its provisions make the tool bar (though separate) integral with the tool base.

Fig. 1 shows a tool-box base in plan, 24 in. by 24 in., with two tool bars B.B., for sliding or for facing, with nine 2 in. dia. gripping studs. Fig. 2 shows the same, in elevation. Fig. 3 and fig. 4 represent the means of gripping, as also does fig. 5.

In figs. 1 and 3 it will be seen that the tool bars, or one tool bar and a "dummy" bar, are laid alongside and touching the three 2 in. dia. gripping studs.

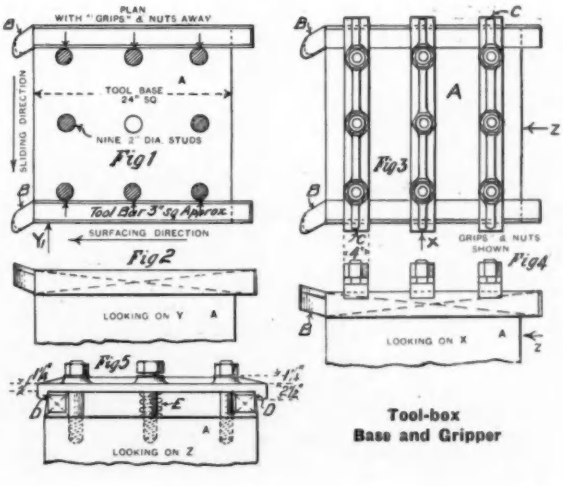
The grips, besides holding the bars by means of the studs and nuts, are super-gripped by the ends C, which, with about 10 deg. taper, have a gripping means at each end, the 10 deg. taper also applying to the outside face of each particular bar or "dummy."

In operation, using one bar, three studs and nuts are used for gripping, and another bar or a "dummy" is used for packing. Pulling down the nuts at one end of the grips squeezes the tool bar with great force against the two-inch studs, and, while pulling down the nuts of the 2-in. studs at both ends of the grips, give greatly increased force to the grip on the bar.

The grips are of cast-steel, and D shows the bevelled ends of the grips as well as the tapered sides of the tool-bars B.

For the easy changing of the tool bars, the strong helical springs E lift the grips free, so that any bar can be quite easily drawn away from its seat in an end-wise direction.

HEAVY TURNER.




**Tool-box Base and Gripper**

# Automatically Controlled Power Station

## Interesting Hydro-electric Power Plant in Northern Ontario, Canada

IN Canada water power is recognised as one of the chief natural resources of the Dominion, and the fact that the capital invested in hydro-development now exceeds that in any other industry will give some idea of the rate of growth of this important branch of engineering.

One of the most interesting of recent projects is now in operation in Northern Ontario at the Upper Notch, where the

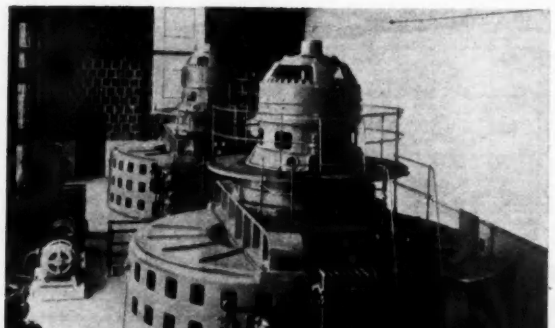
**11,000-volt Switchgear**

13,000 kVA of plant, with its convenient form of automatic control, forms a further step in the enterprise of the Power Corporation of Canada, Limited, whose engineering and construction divisions were entirely responsible for the design and construction of the installation, and with whose permission the following particulars are published.

The station is located at the Upper Notch on the Montreal River, 12 miles south of Cobalt, in lonely surroundings. In its natural state, the Notch consisted of small rapids in the river, which winds its course through the rugged north country and drains into Lake Temiskaming. Except for the ore mines with which the town of Cobalt and the small camp at Silver Center are associated, the country within this region is in its natural undeveloped state of wild bush, which spreads for many miles over rock and ravine. The only approach to the Notch is by a single spur line on the Temiskaming and Northern Ontario Railway, which runs between Cobalt and Silver Center, a distance of about 18 miles.

Appreciation of these conditions will help one to realise the difficulties and hazards that had to be encountered in getting large electrical equipment to so remote a part of the country. Special constructional methods were necessary, and provision had to be made to meet the extreme climatic conditions. It is noteworthy that the greater part of the concrete for the dam and piers was poured during the winter of 1929, despite the severe weather conditions and temperatures, 20 to 30 deg. F. below zero.

Operations began in June, 1929, and the plant was put into commission on to the 110,000-volt transmission system on November 12th, 1930. The plant consists of two 6,500-kVA, 11,000-volt, 3-phase, 25-cycle generators driven by Francis-type waterwheels, which run at 125 r.p.m., and each machine is fitted with a directly-coupled exciter. The 11,000-volt switchgear was supplied by A. Reyrolle & Co., Ltd., and is of their well-known metal-clad construction, with horizontal-draw-out oil-immersed circuit-breakers. The five-unit assembly comprises two generator units, a main step-up transformer bank, a station service unit, and totalising metering equipment. The circuit-breakers are each equipped with d.c. solenoid mechanism for electrical operation, and the generator circuit-breakers operate in conjunction with the automatic control scheme. Each circuit-breaker has a normal rating of 800 amperes at 12,000 volts, and an interrupting capacity of 250,000 kVA.



**Hydro-electric Alternators**

On the control board, in addition to the usual apparatus, are two automatic control-panels for the generators (those at the extreme left and fourth from the left), adjacent to their appropriate manual-control panels, Reyrolle electromagnetic relays fulfilling the desired functions. The initial starting and stopping operations are performed by switches located on the control panels.

The commissioning transfer switch is put into the "automatic" position. The "start" switch is closed and, providing that all protective devices are in their normal standing positions, the master control relay is energised, initiating the train of automatic operations by : (*a*) short-circuiting the pressure-controlled oil-pump motor starter and changing over to continuous running through an oil pilot relay; (*b*) operating the governor solenoid, which releases the limit stop lever, admitting oil pressure to the throttle valve and opening the gates; (*c*) cutting off the oil pressure to the brake valve, thereby releasing the brake.

The machine starts to rotate and the exciter voltage builds up to a predetermined value; a field-indicating relay closes the contactor of the field switch. The machine voltage builds up to a value corresponding to nearly synchronous speed; the automatic synchronising apparatus takes control of the governor

**Main Automatic Control Board**

and adjusts the speed by transmitting "raise" or "lower" impulses to the synchronous motor, the main circuit-breaker being closed at the instant of synchronism. The automatic synchronising apparatus is then put out of commission.

The sequence when shutting down is as follows: the control switch opens, de-energising the master control relay, which starts the shutting-down train by: (*a*) de-energising the governor oil pilot relay and returning the pump motor to pressure control; (*b*) opening the governor solenoid to close the oil valve; (*c*) preparing the circuit to the brake valve solenoid and the field-switch trip-coil.

The gates start to close and the governor reduces the speed of the machine. When the gates are fully closed a limit-switch on the gate-rods trips the main circuit-breaker, which in turn trips the field switch and also opens the brake-valve solenoid circuit, thereby applying the brakes.

The protective features incorporated are for machine-winding failure, a.c. overload, field failure, excessive bearing and machine-winding temperature, cooling-oil and water-flow failure, machine overspeed, and governor oil-pressure failure.

Except under the last condition, all the protective devices shut down and lock-out the plant, which cannot be started again until the trouble has been remedied and the lock-out has been reset. If the governor oil-pressure fails, the shut down will be temporary only and the machine affected will automatically start again when conditions become normal. The whole of the switchgear and control apparatus has been made suitable for manual operation in an emergency without affecting the functioning of the protective devices.

The power is generated at 11,000 volts and stepped up through outdoor transformers to 110,000 volts. The transformers may be isolated by switches from the single transmission line, which runs 32½ miles over bush country and across Lake Temiskaming to connect with the 110,000-volt, 25-cycle system at the Quinze power station, Angliers, Quebec.

# Making More Profits. By A. W. Willsmore, F.R.Econ.S.

## Systematic overhauling of every possible source of profit is desirable

INDUSTRIAL management should always be interested in the question of increasing net profits, but to-day the effects of the world-wide slump in general business have made the problem one of vital importance. Most concerns in the electrical trade, and indeed in almost every industry, are faced with declining net profit totals—due either to a falling-off in business volume or to reductions in selling prices, conceded to enable sales volumes to be maintained. Nearly all are giving serious attention to ways and means of increasing or preserving profit levels. In some cases attention is being focused on overhead charges; in others managers are going over their pay rolls with a pruning knife eliminating dead wood and cutting back overgrown shoots; while still others are concentrating their attention on improving their manufacturing methods with an eye to reduced costs. These courses of action often yield very desirable results, but they do not go far enough. No company can hope to secure maximum profits through attention to one individual source of saving. The problem is much too broad, and optimum results can only be expected where there is a systematic overhauling of every possible source of extra profit.

### The Constitution of Profits

Net profit is a resultant factor arrived at by deducting all outgoings from all income. It may be said that any child knows that, but some hard-headed business men do not seem to realise that they can increase their profits only by widening the margin between outgo and income. The question of deciding whether or not to reduce selling prices is often a case in point. A company finds its volume of sales falling off because competitor A and competitor B have reduced their selling prices, and in order to keep up its business the company decides to reduce its own prices in line with those of its competitors on the argument "if they can do it, we can." Unfortunately this does not always follow, and the company sees afterwards that it would have paid it better to have been satisfied with a smaller volume of business at the higher price. The only way to tackle the problem is to calculate what will be the total difference between income and outgo at the increased volume of sales if the suggested cut is made, and to compare it with the balance that would be left on the smaller volume of business that could still be secured if prices were maintained. If the calculation shows that a higher figure is secured in the second case, then the right policy may be to maintain prices even though everybody else in the business may have reduced theirs.

The same argument applies to any proposed economies. It is no use spending £100 to save £50, and it is short-sighted to save £10 now at the expense of storing up £50 worth of trouble for the future. A long view must be taken. Things will not always remain as they are to-day, and although it is tempting to leave to-morrow's troubles until to-morrow comes, that is not the way to get the most out of a business.

### Increasing Sales

The only way to increase net profits is to increase income or reduce outgo, and in a manufacturing company this means to increase sales or to reduce expenses and costs. The problem of increasing sales can be approached from two angles, either from the viewpoint of increasing sales of existing lines, by added sales effort or fresh advertising campaigns, or of introducing entirely new lines; but in both cases it is a question of what extra income can be obtained, and what it will cost in increased expenses to secure it. The introduction of new lines is a serious problem. Before any decision can be taken, careful market studies must be prepared to see that there is sufficient demand to justify the expenditure involved, and to ensure that prices are fixed to give maximum net returns.

It may sometimes pay better to drop certain existing lines than to increase the variety of products handled. Almost every company is handling some product on which it is either making a loss or showing only a negligible profit. Attention should be given to such cases to find out whether it would not pay better to drop the particular speciality and concentrate all efforts on those lines that show a good profit. It is impossible to lay down any arbitrary laws on this point, but the study of the selling side of the business should be directed more towards the ideal of securing sales of high profit-bearing lines than sales of low-rated products. The figure of total net profit resulting from sales should be the deciding factor and not the mere volume of sales themselves.

### Reducing Expenses

Having adjusted the sales side, attention must next be paid to the reduction of expenses, and here the problem is a much more complicated one by virtue of the enormous variety of different expenses incurred, and by reason of the fact that the extent to which the various individual expenses are controllable by the company varies considerably. Attention must also be paid to the probable effect on sales of any contemplated reductions in expense. In many concerns the first effort at reducing expenses is to cut down advertising allocations, but this action may have exactly the opposite effect from that desired, in that it may lead to a falling-off in sales which more than offsets the saving in expense. If anything, advertising expense should be increased in hard times in order to check a falling-off in sales, and the time test of the desirability of advertising should not be "How much is it costing us?" but "What is the net return we are getting on the expense involved?"

Very much the same argument applies to sales expenses. It is a bad policy to dismiss salesmen if they are actually earning more than their keep in bringing in new business. There are, however, almost invariably many overhead expenses in which economies can be effected to give a real increase in net profits. Where such savings can be looked for must obviously depend on the nature of the individual business, but, speaking generally, every individual item of expense should be questioned to determine whether any real saving can be made. Is too much money being spent on rent? If so, is it because office accommodation is too expensive and would a move to a district of cheaper rents be advisable? Can factory and office lay-out be rearranged so to enable unused floor space to be rented? Is too much money being spent on travelling and entertaining? Would a reduction in these items adversely affect the business? Have the company's employés a due appreciation of the need for economy, or is there an excessive use of stationery, office supplies, telephone calls, telegrams? Small items in themselves, it is true, but in the aggregate very valuable savings can be effected if everyone concerned is really anxious to keep such expenditure down. Such savings as these cannot be effected by rules and regulations; the only way to secure them is to enlist the wholehearted co-operation of the staff.

### Reducing Costs

Perhaps the greatest field for savings, and hence increased profits, in a manufacturing business is in the factory itself, and here the movement should be towards finding the cheapest and best way of performing each individual operation, and towards eliminating all wastage of material, money, time and effort. Process methods should be investigated to see if there is a cheaper way of doing the job. It may be practicable to work the plant, or certain individual departments, two shifts a day instead of one, and thus spread overhead expense over a larger volume of output. Or it may be possible to economise in labour on certain operations. There

**Upper Notch Power Station, Canada** *(see opposite page)*

may be certain machines lying idle for which no work can be found in the usual way, but which can be adapted to turn out parts for which there is a demand in other fields. If no work can be found for these machines, and there is no likelihood of ever finding enough work for them, the balanced condition of the plant should be investigated thoroughly to determine whether there is any really surplus equipment that can be sold or scrapped without affecting future production requirements. On the other hand, there may be certain jobs which the factory is handling, and for which it is not really suited. Such jobs always involve high costs, and economies can frequently be effected by sub-letting this portion of the work. Is the factory lay-out conducive to optimum results, or would a rearrangement of plant lead to lower costs? Has sufficient attention been paid to the introduction of incentive plans as a means of securing more economical factory operations? Is the handling situation as efficient as it should be, or could improvements be profitably effected? What are the methods in use for the salvage and disposal of scrap and obsolete and excess material? Can these methods be improved upon? Questions such as these directed towards every angle of the manufacturing situation may lead in the average factory to the discovery of surprising sources of economy.

### Saving on Purchasing

Most important of all, the company's purchasing methods should be overhauled to ensure that the concern is buying its raw material and other requirements at the lowest possible price. It is not sufficiently appreciated that for the electrical industry as a whole nearly 50 per cent. of the total cost of production represents material and supplies purchased from outside sources. Savings may be secured through scientific purchasing; the expenditure involved in studying market movements to secure that the lowest possible prices are obtained is money well spent. Savings can also be effected through keeping raw material inventories down to economic low levels. Admittedly no concern can afford to have its plant held up through an insufficiency of stocks of raw material, but at the same time overlarge stocks mean so much investment lying idle with increased risks of depreciation and deterioration. The whole question of inventory control needs careful consideration to ensure that investment is kept at the lowest possible figure without prejudice to the company's interest, and this applies as much to stocks of finished goods as to raw materials.

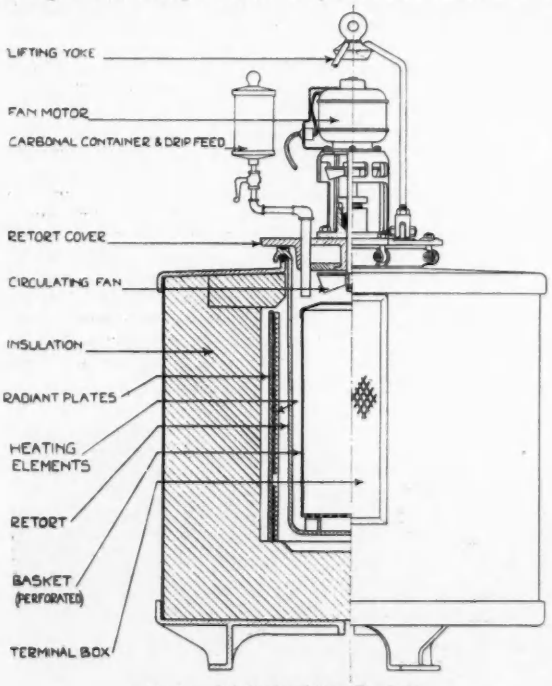
Attention must also be paid to the possibility of speeding up turnover. The more often a company can turn over its investment in any year the greater will be the net profits it can earn. Small profit and quick return is generally a much better policy than higher profit rates with an unduly long tie-up of investment. Strenuous efforts should therefore be directed towards speeding up the turnover of goods in process, securing a more rapid disposal of finished goods and hastening collections on receivables. The savings from these actions may be more or less intangible, but they are nevertheless valuable and their effects show up quite clearly in the final profit and loss balance.

Though the above list of possibilities is not by any means complete, the suggestions put forward will serve to indicate the direction in which these economies should be sought. The problem is not one to be tackled in a half-hearted fashion. It is a matter of the most vital importance to every concern no matter whether the management is satisfied or not with existing profits. In the industrial recovery that should soon be under way, success will go to those businesses that are able to handle their affairs at the minimum of cost, and the whole future of an individual company may well turn on the care and consideration given to the elimination of unnecessary expenses and the reduction of manufacturing costs.

# Industrial Heat Treatment

## A new method of case-hardening in an electric furnace

A NEW method of carburising has been introduced in America by the Hevi Duty Electric Co., whose European patent rights are controlled by Wild-Barfield Electric Furnaces, Ltd., and G.W.B. Electric Furnaces, Ltd. The charge to be treated is loaded in a basket, and although no special attempt is made to keep the components of the charge from touching each other, they should be so placed to allow the circulation of the carburising medium to take place throughout the charge. In this way maximum uniformity in penetration and structure is obtained. The loaded basket sits inside a heat-resisting-alloy retort inside the furnace chamber. In place of a basket, plates suspended on a vertical rod can be used for bevel and other gears and camshafts are suspended inside the retort, which is fitted with a special cover, making a sealed working chamber. A motor-operated patent paddle fan incorporated in the cover circulates the carburising gases throughout the charge.




"Carbonal" Carburising Furnace

The furnace and charge are brought up to heat with the fan running to give a rapid and uniform rise to the carburising temperature of about 940 deg. C., depending upon the type of steel used and the kind of case structure required. "Carbonal" is then introduced into the hot retort by means of a drip feed attachment mounted on the retort cover.

This material is made up of a vegetable base very rich in hydrocarbons. On entering the retort it is forced outward against the hot walls by the centrifugal action of the fan, and is immediately cracked up into hydrocarbon gases which circulate through the charge, thus exposing the latter to a very active carburising agent. The forced circulation assures fresh uniform gas being brought to the work continuously. A penetration of from 12 to 15 thousandths of an inch at 930 deg. C. takes place per hour. After the carburising cycle is complete the retort is lifted out of the furnace by overhead gear and cooled in the air, while a second loaded retort is placed in the furnace. In some cases the carburised work is quenched from or a little under the carburising temperature, this being accomplished by removing the cover and handling the charge direct to the quench by means of the basket containing the charge.

### Current Consumption

The production costs are based on a typical furnace having an inner basket dimension of 18 in. diameter by 42 in. deep, accommodating a charge of work weighing 1,000 lb. A furnace of this size has a loading of 75 kW, with which it would be possible to bring the total gross charge up to carburising temperature in three hours, and during this period approximately from 200 to 225 kWh would be consumed. The consumption is less than what would be represented by the full input of the furnace for three hours, because the chamber temperature rises quicker than that at the charge centre and the furnace goes on control before the charge is saturated. Three hours, however, is a fair estimated time for this.

The radiation losses are 15 kW at carburising temperature. For a case depth of 1/16th in. the normal carburising time is four hours, resulting in power consumption of 60 kWh. The total current consumption for the whole cycle (lasting seven hours) is approximately 285/300 kWh, or a production rate of 3.33 lb. per kWh.

Where possible a lower production cost can be obtained by loading a spare retort into the hot furnace, and still further reduction can be made if the work can be quenched from the basket and the already hot retort loaded and replaced in the furnace without losing much of its heat. Under these conditions weights as high as 5/5.6 lb. per kWh can be obtained. For case depths of ¼ in. and 3/16th in. the respective carburising times are 8 and 15 hours. The consumption of "Carbonal" for the foregoing operation is about one pint per hour, and the cost of the material is about 8½d. per pint. The total cost of carburising per net lb. of components, including the cost of current, "Carbonal," and amortisation of retort and basket, based on a 1/16th in. of case depth and an average load of 1,000 lb. per charge varies from 0.186d. at ¼d. per kWh to 0.411d. at 1d. per kWh.

# German Railway Electrification

## Excellent results from all aspects have been obtained by the conversion of the German State Railways

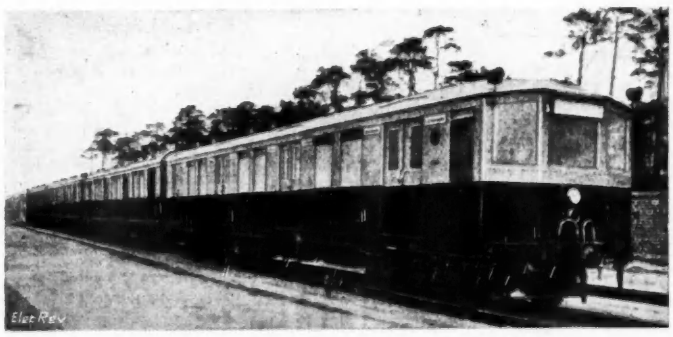
(FROM A BERLIN CORRESPONDENT)

AT a moment when our Government has under serious consideration the electrification of the entire British railroad system, the experiences of another nation must necessarily be of interest.

In Germany it had been decided many years ago that the State railroads should be electrified, with the exception of the trunk lines, where difficulties due to international service held up further consideration of the change until the other countries in Europe should become convinced of the great practical and economical advantages of railway electrification.

As a result of the war, however, the electrification scheme has had to be postponed. Although it is recognised that railway electrification, once established, brings with it substantial economies in working costs and a reduction of running expenses for upkeep of roads and rails, the expenditure on re-organisation must necessarily be considerable. Since the German State railroads are called upon to pay £30,000,000 yearly for reparations, the large initial sums necessary for the carrying through of the more ambitious plans for electric railroads have not been available. It would be quite wrong, however, to assume that the idea of electrifying the entire State railroads of Germany has been abandoned on account of temporary financial difficulties, for the leading German railway authorities had, a score or so of years ago, made up their minds that the trains of the near future must be electrically propelled.

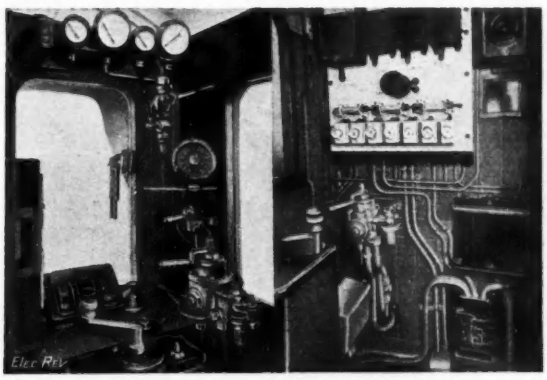
The State railroad authorities, unable for lack of capital to carry through the plan of general electrification, decided in 1927 to electrify the Stadtbahn, which is formed by a network of lines connecting the capital with Potsdam, Gossen, Werder, Nauen, Orianburg, Königswusterhausen, Strausburg and Furstenwalde—in all about 190 miles. This work was completed in two years, without for one single hour disturbing the existing locomotive system in any way. The existing rails and stations were utilised just as they were. The only change was the laying down of the third rail on the right-hand side of the track. When that was once completed it was merely a matter of changing the new cars for the old.



Train made up of two Motor and two Trailing Coaches

And so it was that in the fall of 1929 the good citizens of the residential city of Potsdam went to bed one evening possessed of a decidedly ramshackle railroad connection with Berlin, of the locomotive-drawn, noise- and smoke-emitting kind, with old-time bench waggons with their slamming doors, and jerking ways. They awoke next morning to find an entirely modern electric-train service, made up of gaily coloured blue and brown saloon cars, with big double sliding doors that opened and closed noiselessly. The domed roofs were fitted with the latest electric lighting fittings flush with the ceiling; under each luxuriously upholstered seat were electric radiators supplying ample heat. The carriages are constructed to seat 75 travellers, but there is ample standing room, so that during rush-hours double that number can be accommodated. The brakes are applied and the doors closed by compressed air. If the driver should overlook a contrary signal an automatic device cuts off the current and applies the brakes. For this purpose the signal-posts are provided with short pieces of rail worked from the signal-box; these strike a lever on the train which operate the switches.

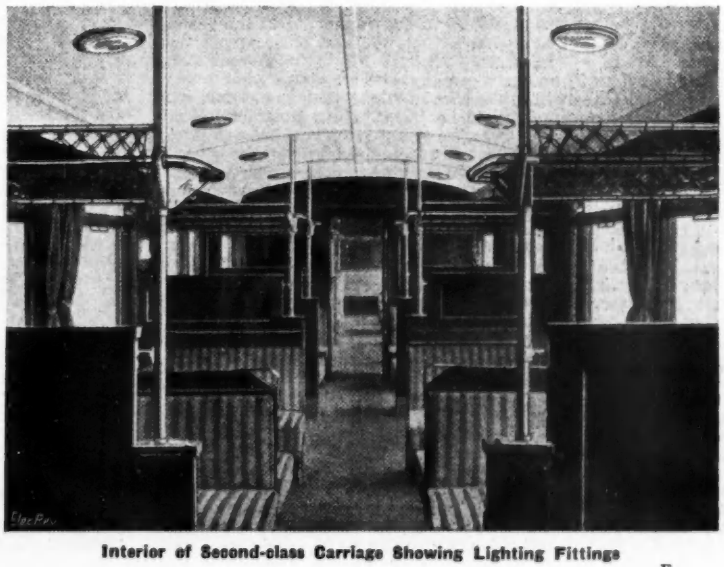
In the illustration of the control cabin may be seen in front of the driver the three measuring instruments and the brake valve; above that is the speed indicator, the lever for the compressed-air pipe, and the compressed-air manometer, while in front of the window is a window cleaner. Along the side are the 200-V main regulators and the switches for the control of power for heat and light. What those conservative Potsdamers found further was that those well-ventilated, heated, lighted saloon trains, so light and airy looking, brought them more rapidly to their destinations. The longest distance on the Stadtbahn, which had hitherto taken 120 minutes to cover, was now accomplished in 80 minutes. The number of trains was increased in the ratio of five to one, since they can be made up of two, four, and eight carriages, for every second car is constructed with motor or trailer, the other being fitted with controlling gear. The controller's cabin, even with its complex instruments, is only about 4 ft. long, which should be compared with the space occupied by a locomotive and its tender.



Two Views of the Control Cabin

The travelling public has recognised the advantage of a service quintupled and simultaneously accelerated. The Stadtbahn lines, in their newly electrified form, have been working for two complete years with immense success. They have worked faultlessly, the supply not once having failed, with great increase of comfort for passengers, and a notable reduction of working expenses. As a result of the experience with the Stadtbahn scheme the German State railroad authorities will proceed with the electrification of the entire German railroad system at the earliest possible date, *viz.*, when the financial situation permits. For short distances the third rail with 750 volts continuous current has been found most practicable; for long distances the third rail and alternating current. Already several big concrete water-power dams have been constructed in advance, the largest being in Bavaria, which will furnish almost unlimited cheap power.

It is said that the profits realised upon the Stadtbahn lines during the two years of their existence have been 25 per cent., but it is difficult to compute the exact economies made because they can only show themselves completely later on in



Interior of Second-class Carriage Showing Lighting Fittings

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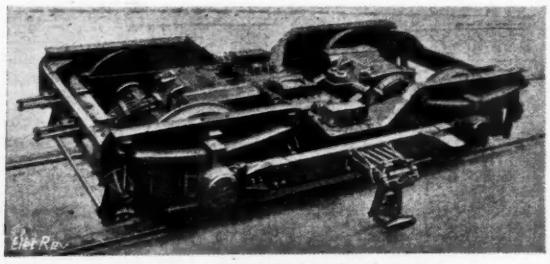
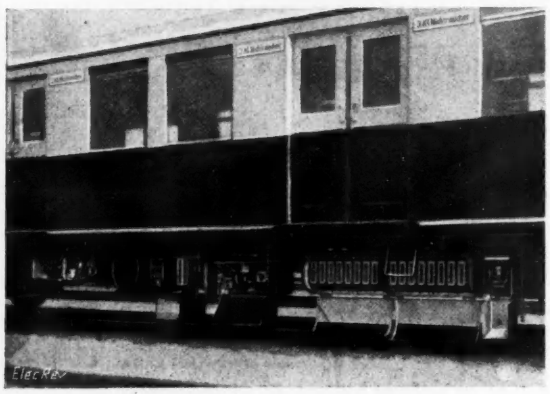


Frame of Car Showing Rail Shoe



Section of Coach; Control Gear Exposed

the form of reduced costs of repairs to permanent way, bridges, and tunnels consequent upon the far smoother and lighter running of the electric trains, as compared with the much heavier strain usually imposed by the steam locomotives.

An important economy with the electric train is due to the comparatively small amount of cleaning needed, for the carriages are not submitted to a continuous rain of coal dust, smoke, and steam, as with steam locomotion.

Every effort is being made in Germany to reduce materially the weight of the cars upon the electric railways. One of the efforts in that direction has been in the utilisation of silicon steel. Experiments are also being made with a special form of aluminium.

Third-rail Guarding

Half a train is reckoned at four saloon cars, two of them with motors, and two trailers. On the Stadtbahn lines the usual number of cars making up a train is four, as a frequent service of short trains meets the public needs better than a few long ones. With the aid of a new automatic coupler it is a matter of the utmost ease to change the size of the trains quickly according to demand, and in this they differ completely from the steam-locomotive train, which could cope only with great difficulty with sudden alterations in traffic conditions or unexpected demands for the additional services. An outstanding advantage of the electric train is that it may run through the most lovely scenery or residential districts without either disfiguring the landscape or smothering homes with coal dust and smoke, not to speak of sparks that have so often in dry weather caused disastrous forest fires, or set hayricks aflame. The saloon type of car, usually gaily painted light blue and red to distinguish the classes, affords notes of colour and animation to a countryside and its relative noiselessness and cleanliness earns the goodwill of all having homes about the line, to whom its rapid service is a godsend.

# Electrified Railways in Sweden

## Statement by the Minister of the Interior

THE following information regarding the present state of railway electrification in Sweden is due to the courtesy of Mr. Lübeck, Minister of the Interior:

"The present length of the electrified railways in Sweden is 909 kilometres, of which 450 kilometres is in the north and 459 in the Stockholm-Göteborg (Gothenburg) area.

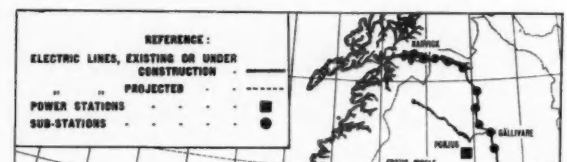
"Lines being adapted for electrification include the line from Ange to Malmö, with a number of side-lines, making up altogether 860 kilometres. This highly important line, which links up the capital, Stockholm, the university city of Uppsala, the trading city of Göteborg (also a university town), Lund (famous for its observatory and ancient buildings), and Malmö, the seaport on the Sound, the jumping-off place for the Danish capital, Copenhagen.

"When the now projected electrification schemes are completed, which is expected to be between 1937 and 1940, Sweden will have 2,900 kilometres of electric lines, that is to say, 40 per cent. of her entire railroad system.

"The electrification of the Swedish railroads is highly appreciated, first, because of the great economy of time; thus, the journey from Malmö to Ostermund, with the steam locomotives, takes 24 hours. When the line is electrified the same journey will be accomplished in 14½ hours—a reduction of no less than 9½ hours. Secondly, the higher speed obtained in the electrified train service makes it possible for the railway to operate many more trains upon a single line or track, and it therefore becomes possible to grant lower rates for passengers and freight. Furthermore, it has been found from experience that increase in number of trains notably augments traffic of all kinds. This has been demonstrated upon the Stockholm-Göteborg track.

"How great the gain of time is, as between the locomotive train service and that of the electrified system is again illustrated by the improved working of the Stockholm-Göteborg line; under steam traction the distance was covered in eight hours and forty minutes, but since its electrification the time has been reduced to six hours and four minutes."

It will be noted that the Swedish Minister of the Interior confirms from experience that the electrification of railroads makes for a much more rapid train service with notable saving of time for both passenger and freight traffic. He emphasises the increased popularity of railroad travel due to the more frequent train service, since it is easy with electricity to multiply the number of trains run. The ability to run more trains upon the electrified lines enables considerable reductions of both passenger and freight rates to be made, which in itself makes transport by rail more popular. Thus the effect is cumulative, and, having a general application, is a justification for regarding the estimates contained in the Weir Report of Main-line Railway Electrification in Britain as being conservative.

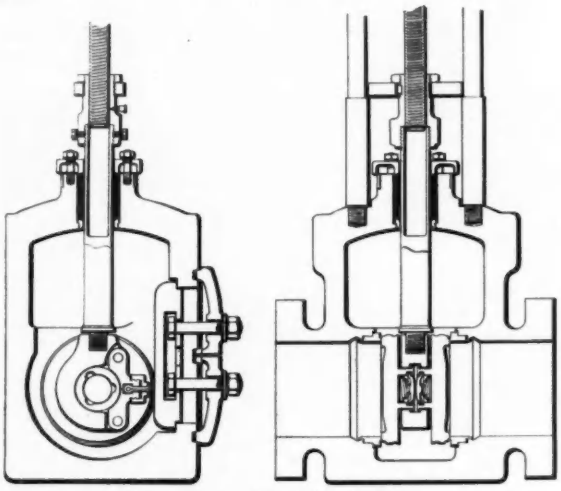



Map Showing Electrified Railway Systems

# Valve with Pressure-held Cover

## Internal inspection can be carried out in very little time, with negligible expense, and without disturbing working parts

THE principal feature of the new "Victory" valve produced by Victory Valves, Ltd., is the utilisation of the pressure within the valve casing to maintain a steam-tight joint at the inspection cover. This is effected by an internal cover in exactly the same way as the standard practice for manhole covers of boilers and steam receivers. The design was first produced to provide a more suitable



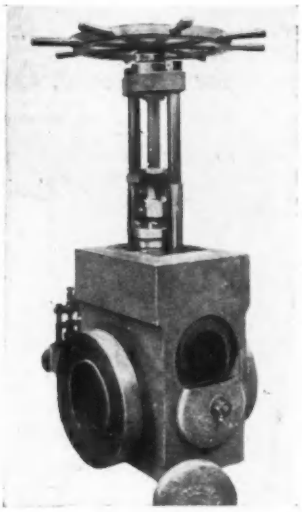
Constructional Details of Valve

cover joint for e.h.p. steam, but the advantages have led to the adoption of the valve for moderate and low pressures of both steam and water. A further advantage of the design is that it permits valves for very high pressures and temperatures to be made from mild-steel forged billets in sizes up to 16-in. bore.

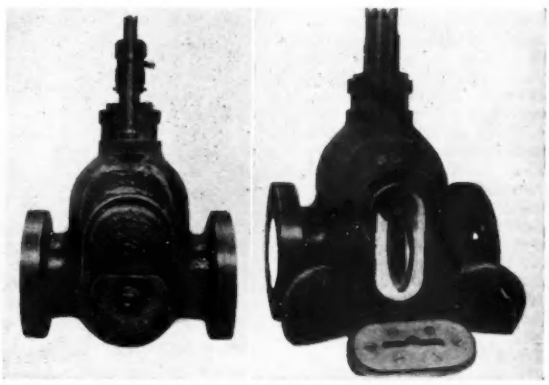
The door is placed at the side of the valve, and it can be removed without disturbing the working parts which can thus be inspected during the entire opening and closing operations, and any foreign matter in the valve can easily be removed. One very great advantage from the maintenance point of view is that as the door is quite independent of the working parts it can be handled without the use of lifting tackle. For a 10-in. parallel slide valve for 1,000 lb./sq. in. the cover only weighs 38 lb. The size of the cover and the design of the working parts enables the latter to be withdrawn and replaced without the use of any special tools. The general design of the valve is applicable to all types of valves, but to facilitate description reference will be confined to the parallel slide valve as the most common type.

In place of the usual cross clamps fitted to manhole joints two cover caps are fitted and located in circular machined grooves which support the cover when there is no pressure inside the valve. After removing one cover cap the internal cover can be held in position by the bolt while the second cap is removed, thus making for very easy handling.

To permit easy withdrawal of the valve disks the belt eye is of special construction, similar to that of a crane hook, having its mouth closed by two hinged pieces joined together by a cap nut which is definitely locked by a strong split-pin, the head of which is housed in a recess between the two hinged portions of the eye. The hinged portions serve only to locate the disks, the working stress being taken by the solid portion of the eye attached to the valve stem. This design also allows for the disks to be entered and withdrawn singly. Three small lugs on the spring plates serve to retain the compression of each disk spring to within about ½ in. of its desired loaded length. The outer surface of each plate is spherical, so that the two plates do not come into contact until the second disk is completely on its seating, and pressing this disk home into the belt eye loads each spring to its desired length. The form of belt eye also allows for a disk clipping arrangement to be embodied which prevents the disks being opened out at the top when the valve is in the open position. The removal work is simplified considerably by each disk being handled separately. Apart from these special features the design of the valve is in conformity with the general standard for high-class work.



Ten-in Valve for 955 lb./sq. in., 830 deg. F. (Forged-steel Body)



"Victory" Valve "Closed," "Open"

# Electricity in the Home

## Its Use for All Purposes at a Total Cost of 1d. per kWh.

MANY householders are dubious of the economy of the "water tap" use of electricity for all domestic purposes, even when the average cost is about 1d. per kWh, but in the smaller class of house, of some five rooms, plus the usual bathroom and scullery, there is no reason why, provided economy is exercised, an all-electric service should not be used, thus promoting cleanliness and saving labour.

Whilst fully admitting that "water tap" use of electricity is more expensive on a fuel cost basis than other forms of heat unless current can be obtained at 0.5d. per kWh, the average householder can, by watching his meter and exercising care in the use of heaters, enjoy most of the advantages of electricity at little extra cost, as the following data will show.

In my house there is no coal or coke heating whatever. Plug points are installed in the dining room, drawing room, and the main bedroom for electric radiators. Hot water for the bath is obtained from a gas copper, and for all other purposes from an electric kettle. Cooking is performed on a small "Jackson" cooker, the family being four in number. In addition, a vacuum cleaner and an electric iron are used.

It must be emphasised that the heating switches should be closely watched, and the temperature reduced when a room appears to become overheated; in other words, economy must be practised. The result is that I am able to avoid the work involved in cleaning fires, grates, &c., at a slightly increased cost compared with the older methods of obtaining heat—but the extra cost is well worth while.

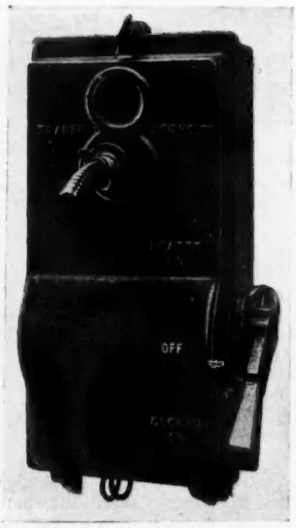
The actual cost during one year is given below, but, naturally, if the charge for current were 0.5d. per kWh, more extensive use would be made of fires in bedrooms and the like. The "all-in K tariff" (for private dwelling houses) of the Beckenham U.D.C. Electricity Department is now 8 per cent. of the rateable value of £24=£2 per year, plus for each kWh consumed in the summer months 0.75d. and in the winter months 0.9d. (last Christmas the rate per kWh was still 1d., but it has since been reduced). Hire charges amounted to £1 13s. 4d. Quarterly consumptions and payments in 1930 were as follows:—

| Quarter. | Total kWh. | Charge for kWh. | Total, including charges and hire. |
|---|---|---|---|
| Midsummer ... ... | 727 @ ¾d. | £2 5 5 | £3 4 5 |
| Michaelmas ... ... | 398 @ ¾d. | £1 4 10 | £2 3 10 |
| Christmas ... ... | 1,313 @ 1d. | £5 9 5 | £6 8 5 |
| Lady-day ... ... | 1,983 @ 0.9d. | £7 8 9 | £8 5 1 |
| | 4,421 | £16 8 5 | £20 1 9 |

Total cost for year=£20 1s. 9d.; deducting hire charges (£1 13s. 4d.), the cost of electricity was £18 8s. 5d., which gives exactly 1d. per kWh as the average overall cost in my home.—F. S. SPARROW.

# New Apparatus and Devices

## for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes



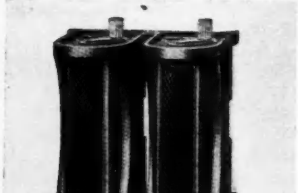

Reyrolle Change-over Unit

### Change-over Control Unit

A. REYROLLE & CO., LTD., Hebburn-on-Tyne, have recently marketed a change-over unit for the control of domestic appliances. It consists of a change-over switch with self-aligning protective fuses and a 5- or 15-A British standard plug and socket of the protected type for connection to an auxiliary circuit. With this arrangement a supply may be given to a water-heater or to a cooker or similar appliance as desired, but not to both at the same time. The whole of the apparatus is enclosed in a cast-iron casing finished in glazed enamel. A small pilot lamp is mounted behind a red glass fitted in the cover. The operating handle is suitably interlocked with the cover.

### Service Cut-out

The service fuse box illustrated here is the latest type of all-insulated "Aeroflex-Fluvent" cut-out produced by PARMITER, HOPE & SUGDEN, LTD., Fluvent Electrical Works, Vernon Street, Manchester, and is specially designed for assisted wiring schemes and general house-service purposes. It has an actual continuous carrying capacity of 30A and a guaranteed breaking capacity of 5,000 A at 230 V. On actual tests these cut-outs have frequently broken short-circuits of 4,000 A at 400 V without any evidence of distress. The complete cut-out comprises a moulded insulated sealing chamber capable of accommodating two 0.0225 two-core cables for looping-out purposes, and two s.p. 30-A "Aeroflex-Fluvent" fuses. The fuse cartridges are fitted with "Aeroflex" fuse elements, which can be supplied in any capacity from 5 A to 30 A. The small size of the complete cut-out makes it particularly suitable for house development schemes for lighting purposes only, with the additional advantage that the fuse cartridges can easily be changed for higher ratings if the installation is increased by the addition of an electric cooker, radiators or other appliances without necessitating any modification of the service arrangements.



"Aeroflex-Fluvent" Cut-out

### Spare Bulbs for Motorists

The drawing in of the evenings while many are making preparations for a motoring holiday brings to the forefront the need for reliable lighting. Spare bulbs have to be carried of more than one size, and there is always the risk of breakage. To overcome this the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has placed on the market a neat steel lamp case finished in black crystalline Japan. The interior contains specially shaped recesses into which the bulbs bed; a padded lid holds them in position and protects them from damage due to vibration. The case is made in two types, both 6¼ in. by 4 in. by 2¼ in. deep. The one that will cover the range of most car owners has a bulb capacity of two headlights, of up to 36 watts, two side or tail, one festoon and one ignition indicator. The other type is similar except that it will hold headlight lamps of 48 watts and over.

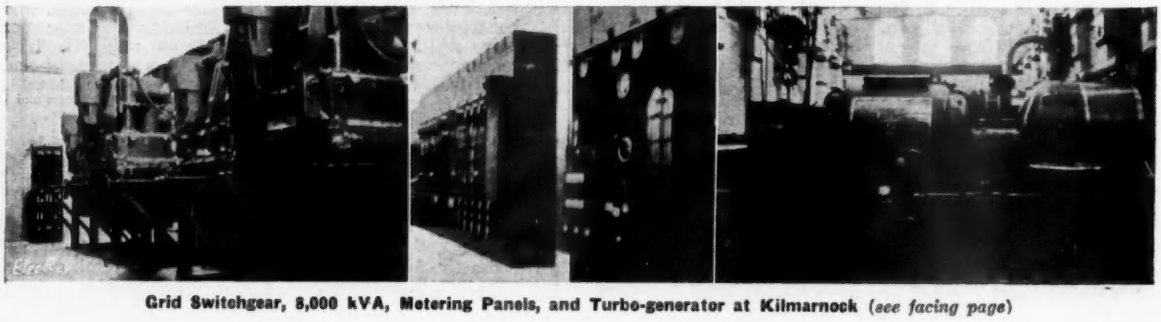
### Wide-range Capacity Testing Set

A compact, portable, and self-contained capacity bridge testing set having a very wide range, 0.00005 to 1.0 $\mu$ F., on a single dial has been introduced by H. W. SULLIVAN, LTD., Leo Street, Peckham, S.E.15. A special feature is that the accuracy with which the scale can be read, from 2 to 5 per cent., is a constant percentage throughout the entire range, except at the extreme ends where it may in the worst cases somewhat exceed 5 per cent. There are many purposes for which one needs to know the capacity of a condenser to this accuracy, especially in experimental work in the laboratory or test-room. The set has a simple four-capacity-arm bridge with a supply buzzer and battery, a supply transformer, and standard condensers, all contained in a box measuring 8 in. by 7 in. by 8 in. The very wide range and the roughly constant per-centage change of capacity for equal angular increments throughout the scale are due to the fact that continuously variable capacity ratio arms are employed, the latter taking the form of two variable air condensers "ganged" together so as to permit their differential adjustment by means of a single dial. Due to this arrangement only two standard mica condensers are required, and these are fitted internally.

Sullivan Capacity Test Set

### Locomotive Testing

In a paper submitted to the Cambridge meeting of the Institution of Mechanical Engineers recently, Mr. H. N. Gresley explains that he has long felt that there is a great need for the provision of a locomotive experimental testing plant in Great Britain, and he has frequently advocated the desirability of the construction of such a plant, which should enable locomotives to be tested under conditions approximating more closely to running conditions than those in the foreign plant described in his paper. For this reason it is suggested that the locomotive could be placed in a wind tunnel so that the locomotive under test would have to furnish the power necessary to draw air through the tunnel past the locomotive, and it is estimated that motors for driving fans of about 2,000 h.p. would be required. When carrying out tests at low speeds, the power required to drive the fans would probably be much less than the locomotive under test was producing. The carrying wheels would therefore have to be so arranged that the power produced by the locomotive would have to be absorbed by dynamos when working at high speeds and by brakes when running at low speeds.



Grid Switchgear, 8,000 kVA, Metering Panels, and Turbo-generator at Kilmarnock (*see facing page*)

# The O.L.A. Summer Meeting

## In the Ayrshire Board's area are numerous examples of rural electrification

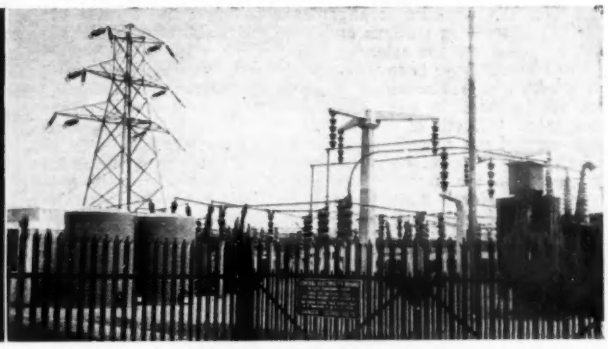
(BY OUR SPECIAL REPRESENTATIVE)

AT the invitation of the Ayrshire Electricity Board, whose chief engineer, Mr. Wm. C. Bexon, is president of the Overhead Lines Association, members of the Association held their summer meeting this year in Ayrshire.

The occasion of the A.E. Board's annual inspection of its area was most opportune and enabled the visitors to see something of the remarkable activities of the Board by way of rural electrification in the county.

The main generating station is situated in the Burgh of Kilmarnock, its capacity being 34,000 kW. The plant consists of two 12,500-kW, one 5,000-kW, one 2,500-kW, and one 1,500-kW steam turbo-alternators. The steam-raising equipment consists of 14 boilers varying in capacity from 10,000 to 60,000 lb. per hour evaporation each.

On Board the s.s. "Juno"



Grid Sub-station at Saltcoats

The generating pressure is 3.3 kV, 3-phase, 50 cycles, and the transmission pressures are 3.3 kV, 11 kV, 22 kV, and 25 kV. The distribution system is 3-phase, 4-wire, at 415 and 240 volts, excepting in the Burgh of Kilmarnock, where a part is direct current. There are approximately 240 miles of overhead transmission lines and 260 miles of underground cable. The majority of the transmission lines consist of 6-wire No. 0 copper carried on "A," lattice, and Callender "Kay" poles. The main transmission line between Kilmarnock and Ayr is built of the latter type of pole. The line between Monkton and Loans, and also that between West Kilbride and Largs, are built on lattice masts. The line between Ayr and Turnberry is built on "A" poles.

The total number of sub-stations is 285. The first open-air sub-station was put into commission in 1918.

The total number of consumers in the A.E.B. area of supply is 20,957, the total area of supply being 1,132 square miles. The charges for electricity are the same throughout the whole of the county, no increase being made to the consumers in the outer areas, as is usually done by the majority of undertakings. The distance from the most southerly point of supply to the most northerly is approximately 65 miles, and the distance between the most westerly and the most easterly points of supply is approximately 40 miles.

There are fourteen burghs in the Board's area in which supplies are available, and it hopes to have a supply available in the remaining burgh (Girvan) for the winter of this year. Supplies are also available in many districts and villages in the county, and there are also approximately 140 farms connected to the mains.

This undertaking was one of the pioneers of rural electrification, and the Board is at present engaged on an extensive system of rural electrification in the Tarbolton and Auchincruive districts.

The proceedings were blessed throughout with perfect weather. Several members who arrived early enjoyed golf at Bogside, Irvine, on the Sunday. A medal-round competition, open to O.L.A. members, was won by Mr. J. G. Griffin, who becomes the holder for a year of a cup presented by Mr. J. H. C. Brooking.

The following programme of events combined instruction with enjoyment of Ayshire scenery and hospitality. The Ayr Station Hotel was made the headquarters.

On the Monday morning motor 'buses conveyed members of the O.L.A. to Kilmarnock, where they met members of the Ayrshire Electricity Board and inspected the power station prior to touring the northern area of supply. After luncheon at Largs the party joined the ladies aboard the steamer *Juno*, which had taken them for a cruise to Rothsay, the Kyles of Bute, and Tighnabruaich. Tea was served on board, and Ayr harbour was reached in time for the official dinner.

Ex-Provost Mathew Smith presided, and the toast of the "O.L.A.," proposed by Col. R. P. Machlachlan, was replied to by Mr. W. C. Bexon, president. The "Ayrshire Electricity Board" was proposed by Brig.-Gen. Walker and the chairman responded, after which the golf prizes were presented by Bailie J. M. Bryce. "Rural Development of Electricity Supplies" was proposed by Mr. Hugh M. Poe, and Mr. W. Fennel replied, while "The County of Ayr and Burghs" was proposed by Major T. Rich, and the Dean of Guilds John McIntyre responded. A vote of thanks to the A.E. Board was proposed by Mr. R. A. Jocelyn Swan.

On the Tuesday morning the party made a motor-'bus tour of the Board's southern area of supply. Luncheon was partaken of at Turnberry, after which the non-golfing members proceeded by road to Ballantrae, where tea was served, then on to Girvan and back, *via* Turnberry, to Ayr, where an informal dinner at which the ladies of the party were honoured guests brought to a close a most enjoyable and memorable event in the history of the O.L.A.

About 50 took part in the meeting, including the undermentioned members of the O.L.A.: Mr. and Mrs. A. Andrews, Mr. F. E. L. Banister, Mr. H. W. Blades, Mr. J. H. C. Brooking, Mr. and Mrs. C. C. Cockbain, Mr. J. Collier and party, Mr. A. Dunderdale, Mr. and Mrs. W. Fennell, Mr. T. T. D. Geesin, Mr. and Mrs. G. Gillespie, Mr. J. G. Griffin, Mr. B. Handley, Mr. and Mrs. W. Kennett, Mr. G. W. Molle (hon. secretary), Mr. R. J. Morris, Mr. G. R. Falkiner Nuttall, Mr. A. P. Petrie, Mr. D. C. Redfern, Major T. Rich, Mr. C. H. E. Ridpath, Mr. J. B. Rudkin, Mr. R. M. Russell, Mr. C. E. Stewart, Mr. and Mrs. R. A. Jocelyn Swan, Mr. E. J. Taylor, Mr. and Mrs. W. A. Turnbull, Alderman J. Robinson, Mr. and Mrs. N. D. Watsham, Mr. S. Winstanley, Mr. and Mrs. R. Borlase Matthews, and Mr. F. Christy.

Rural Sub-station near Largs

Putting Competition at Largs Hotel

# Electricity Supply in Great Britain

## Observations from the Analyses and Summaries of the Returns of Fuel Consumption and kWh Generated, Issued by the Electricity Commissioners for the Year ended December 31st, 1930*

THE analyses and summaries of the returns made to the Electricity Commissioners of kWh generated and fuel consumed at generating stations in Great Britain follow the general form of the previous issue, but the period to which the particulars relate covers the calendar year ended December 31st, 1930. It had been represented to the Commissioners that the alteration of the period from the financial to the calendar year would facilitate comparison with corresponding statistics for other countries, and in deciding to change the period the Commissioners have also had regard to the fact that the working arrangements between the owners of selected generating stations and the Central Electricity Board will be based on the calendar year.

The stations have been grouped as far as possible in accordance with the grid schemes, those in the portions of Scotland not yet included in any scheme being grouped into an area designated "North of Scotland." Grouping has again also been carried out according to the kWh generated.

Returns were received in respect of 559 stations, a decrease of nine from the number included in the last return for the year ended March 31st, 1930: 23 stations were closed down before January 1st, 1930; three new stations and four existing standby stations were put into operation; and seven existing stations which had previously been non-statutory, but which became part of authorised undertakings have been included. The total number of kWh generated at the stations covered was 12,332,949,844, an increase of 3.1 per cent. on the figure for 1929-30. The total amount of coal, coke, and fuel-oil consumed was 9,996,708 tons, or an increase of 1.42 per cent. The proportions of the total electricity by steam, oil, gas-producer, waste-heat, refuse-destructor, gas-engine (town gas), and water-power stations, respectively, are 95.12, 0.63, 0.09, 1.36, 0.18, 0.02, and 2.60 per cent. In making comparisons between this and the previous year's returns the overlap of three months between the two periods covered should be borne in mind.

### Highest Thermal Efficiency

The new Kearsley station of the Lancashire Electric Power Co. heads the list this time for the highest thermal efficiency among steam stations with a figure of 23.84 per cent. The kWh generated at this station amounted to 129,624,646, the average fuel consumption per kWh generated is shown as 1.17 lb., the maximum load on the generators as 35,000 kW, and the load factor as 42.3 per cent. The Deptford (West) works of the London Power Co., Ltd. (ELECTRICAL REVIEW, June 12th, 1931, p. 979), takes second place with a thermal efficiency of 23.20 per cent. The kWh generated amounted to 280,819,210, the average fuel consumption was 1.29 lb. per kWh, and the load factor was 43.3 per cent. Closely following Deptford is the Barking station of the County of London Electric Supply Co., Ltd., with a thermal efficiency of 23.02 per cent., a kWh generated figure of 543,354,400, fuel consumption per kWh 1.38 lb., and a load factor of 37.2 per cent. For the period covered by the previous year's returns the North Tees station of the Newcastle-upon-Tyne Electric Supply Co held the pride of place with regard to thermal efficiency with a figure of 22.83 per cent., the average consumption being 1.28 lb. per kWh, the load factor 51 per cent., and the kWh generated 286 millions. The highest thermal efficiency shown for oil stations is 30.18 per cent., representing the works of Buxton Corporation, with an average fuel consumption of 0.61 lb. per kWh. An efficiency of 17.03 per cent. is the highest for gas-producer stations, and was attained by the composite station of the Skelmorlie Electric Supply Co., Ltd., the fuel consumption being 1.54 lb. per kWh.

### Lowest Fuel Consumption

Kearsley also scores this time with regard to lowest fuel consumption for steam stations, the average figure per kWh generated being 1.17 lb. The second best station under the same heading is North Tees with 1.26 lb. per kWh generated. The total kWh generated at this station was 255,082,530, and the load factor was 50.2 per cent. The thermal efficiency was 22.69 per cent. Two stations share the honour of being third on the list, Ferrybridge of the Yorkshire Electric Power Co., and Barton of the Manchester Corporation, for both of which is shown an average consumption of 1.31 lb. per kWh. 158,521,950 kWh was generated at Ferrybridge and 402,949,300 kWh at Barton. The thermal efficiencies, maximum loads and load factors for Ferrybridge and Barton are, respectively, 22.23 and 22.23 per cent., 40,000 and 110,330 kW, and 45.2 and 41.7 per cent. It is interesting to note that the average consumption figure for the three stations of the Lancashire Electric Power Co., Kearsley, Radcliffe, and Padiham, is 1.45 lb. per kWh. The average fuel consumption for the steam stations for the period under review is 1.90 lb. per kWh generated, as compared with 1.97 lb. for the period of the previous returns. Credit for the lowest fuel consumption among oil stations is given to the St. Martin's Lane works of the Charing Cross Electricity Supply Co., Ltd., with a consumption figure of 0.6 lb. per kWh and 28.96 thermal efficiency. For the gas-producer stations that of the Blandford Forum and District Electric Supply Co., Ltd., is credited with the lowest consumption at 1.47 lb. per kWh, the thermal efficiency being 15.91 per cent. The average fuel consumption for the oil stations shows a slight increase from 0.85 to 0.87 lb. per kWh.

### Load Factors

Fifty stations are represented as having load factors of over 50 per cent., including 19 steam station. Over 60 per cent. load factor is shown for 24 stations, including four steam stations, namely, Leeds Corporation Tramways 72.9 per cent. (thermal efficiency 7.58 per cent., average fuel consumption 3.46 lb.); Oldham Corporation, Chadderton, 64.5 per cent. (18.76 per cent. thermal efficiency and 1.56 lb. fuel consumption); Slough and Datchet Electric Supply Co. 63.0 per cent. (efficiency 9.23 per cent., fuel 3.36 lb.); Paisley Corporation 60.9 per cent. (11.90 per cent. efficiency and 2.55 lb. fuel consumption). Ten stations are shown with over 70 per cent. load factor, one steam (Leeds Tramways), three oil, two refuse destructor, two waste heat, and two water power. The oil station of the Hebden Bridge U.D.C. heads the list on the score of high load factor with a figure of 92.7 per cent. (thermal efficiency 26.33 per cent, fuel consumption 0.72 lb.); the next highest load factor, 85.7 per cent., is attributed to Middleton Corporation's refuse-destructor station; while third on the list is the refuse-destructor station of Stoke Newington B.C., 83.4 per cent. The factors for all these named stations are based on running hours.

### "Selected" Station Averages

The following table presents the average figures for fuel consumption, thermal efficiency, and load factor attained by the "selected" stations in the classified groups.

| Group, millions kWh output. | Fuel consumption, lb. per kWh. | Thermal efficiency, per cent. | Load factor. |
|---|---|---|---|
| A, from 200 | 1.50 | 20.71 | 41.7 |
| B, ,, 100 | 1.60 | 19.87 | 35.5 |
| C, ,, 50 | 1.98 | 16.21 | 33.3 |
| D, ,, 25 | 2.00 | 16.14 | 36.5 |
| E, ,, 10 | 2.07 | 15.02 | 34.3 |
| F, G, and J, below 10 | 3.24 | 11.49 | 28.0 |

* Generation of Electricity in Great Britain; Year Ending December 31st, 1930. H.M. Stationery Office. 1s. 6d. net.

# Spanish Railway Electrification

ONE of the fastest electric locomotives in the world will shortly be put into service on the Norte railway, Spain. It is rated at 3,600 h.p., weighs 150 tons, and is capable of a speed of 70 miles an hour. The motors for this were made by the Metropolitan-Vickers Electrical Co., Ltd. The same company has built the locomotive in co-operation with the Sociedad Española de Construccion Naval. The locomotive is of the 4-6-6-4 type and is for use on the 1,500-V electrified lines of the Norte Railway. Two articulated bogie trucks carry the body, which houses twelve 500-V, 300-h.p. motors mounted in pairs above each of the six driving axles, and coupled electrically, three in series.

Each pair of the electric motors drives down through a flexible coupling to the axle below. The control gear of the locomotive is on the "Metrovick" electro-pneumatic principle. Any one of three motor combinations may be used with any one of three field strengths, giving a choice of nine economical running speeds in service. Provision is made for the use of regenerative braking with two of the motor combinations.

Great progress has been made in recent years with the electrification of Spanish railways. More than eighty firms originally built the country's 10,000 miles of line, but now 7,000 miles of track are under the control of only ten companies. This trend towards grouping has facilitated the co-ordination of services and led to a great improvement in traffic services generally.

The harnessing of water power for the production of electricity has enabled extensive plans for the electrification of main lines to be drawn up, and many schemes have been completed. For these schemes one British firm alone has provided 152 motors. One of the latest lines to be electrified is that between Bilbao and Portugolete, which is about seven miles in length. For this a further 38 motors have been ordered from England. The passenger coaches and trucks for these railways are made in Spain.

# St. Helens Extensions

## New Plant of 12,500-kW Capacity has been Inaugurated this Week

THE enterprising and progressive spirit of the St. Helens Corporation was perhaps never more in evidence, and has never been more justified, than when it became one of the first municipalities in the country to obtain powers to supply electricity so long ago as 1894.

The original power station was opened on a site in Warrington Old Road in December, 1896, and a portion of the borough was supplied with electricity for lighting purposes, chiefly the large shops in the main street. The plant had a total capacity of 145 kW, and alternating current was generated at 1,000 volts and transformed down to 100 V for supply to consumers, who during the first complete year of operation numbered 63; the electricity sold was 35,700 kWh.

In the following year the Corporation purchased the tramway undertaking, for which d.c. had to be provided. Eventually a new power station combined with a refuse destructor was erected at Croppers Hill (on the site of the present station) and opened in July, 1899, the old one being closed down in December, 1899. The capacity of the new plant was 680 kW and the consumption of energy at March 31st, 1901, five years after the commencement of the supply, was 911,000 kWh. From that time onwards the gradual development of the department is best seen by the following table:—

| Year | New plant installed |
|---|---|
| 1911/1912 ... ... ... ... | 1,000 kW |
| 1912/1913 ... ... ... ... | 2,000 kW |
| 1916/1917 ... ... ... ... | 3,000 kW |
| 1922/1923 ... ... ... ... | 5,000 kW |
| 1926 ... ... ... ... | 6,500 kW |

### Present Extensions

With the passing of the Electricity (Supply) Act, 1926, and the formation of the Central Electricity Board, the St. Helens undertaking became a "selected" station under the North-West England and North-Wales Electricity Scheme, 1928. At that date the station was carrying its full economical load, and therefore application was made to the C.E. Board for permission to install a turbo-alternator of 12,500 kW capacity, which has been manufactured and erected by the Metropolitan-Vickers Electrical Co., Ltd., and was officially inaugurated on Wednesday this week.

The turbine is of the impulse two-cylinder design. It is directly coupled to a 3-phase, 50-cycle alternator of 6,600 volts, designed for a power factor of 80 per cent. Steam is supplied to the turbine at a pressure of 250 lb. per sq. in. and a temperature of 700 deg. F.

The condenser is of the surface type with a cooling surface of 11,980 sq. ft.; it is of M-V manufacture, and is capable of maintaining a vacuum of 28 inches (barometer 30 in.) when the turbine is carrying its most economical load of 10,000 kW. Accessibility is provided by hinged inspection doors in the end covers; one cover can be removed by means of a special runway, while the other can be handled by the station crane. The air is extracted by a two-stage steam ejector pump, the capacity of which is 54 lb. of dry air per hour when taking 800 lb. of steam per hour at 250 lb. per sq. in. and 700 deg. F.; this pump will also give its full capacity with a steam pressure of 130 lb. per sq. in. Duplicate condensate extraction pumps are provided, both of the rotary type and driven by electric motors, one a.c. and one d.c. Two centrifugal circulating-water pumps are driven by a.c. and d.c. motors, each having a capacity of 373,200 gallons per hour.

The steam pipe ranges have been supplied by Aiton & Co., Ltd. To meet special conditions the corrugated steel bends and fittings specialised by Messrs. Aiton have been used and have proved satisfactory. Cast-iron circulating-water pipes have been supplied by the local firm of J. Pritchard & Sons, Ltd.

The high-voltage switchgear has been supplied and erected by the English Electric Co., Ltd., including transformers and instruments. The normal current-carrying capacity is 2,000 amperes and the rupturing capacity 500,000 kVA. An automatic voltage regulator manufactured by the Metropolitan-Vickers Co. is included.

An additional cooling tower has been supplied and erected by Peter Brotherhood, Ltd., and is capable of dealing with 280,000 gallons of water per hour and reducing the temperature thereof 15 deg. F. The tower is 80 ft. long by 40 ft. wide by 85 ft. high. The cooling well and foundations for the tower have been constructed by the works' staff.

### Boiler Plant

The new boiler plant has been constructed and erected by Babcock & Wilcox, Ltd., and is similar in size and capacity to the existing plant. The boiler pressure is 275 lb. per sq. in., and it has a normal evaporation of 35,000 lb. of water per hour.

The superheater is capable of raising the temperature of the steam to a total of 750 deg. F. "Diamond" soot blowers are fitted to the boiler and superheater, the blower in the first pass of the boiler being of the "Parry" type. The steel chimney is 5 ft. in diameter and rises to a total height of 106 ft. A "Davidson" grit arrestor has been provided, composed of a primary collector fitted round the chimney and a secondary collector. Messrs. Babcock & Wilcox supplied the coal elevators and conveyors, the bunkers, and ash-handling plant, which are extensions to the existing arrangement. The economiser is of the well-known type manufactured by E. Green & Son and consists of 320 tubes.

The new boiler has been fitted with a mechanical stoker erected by the Underfeed Stoker Co., Ltd. It is of the latest "L" twin pattern, each half of the grate being complete with its own forced-draught fan and driving gear. Flat suspended Detrich arches have been erected over the stokers.

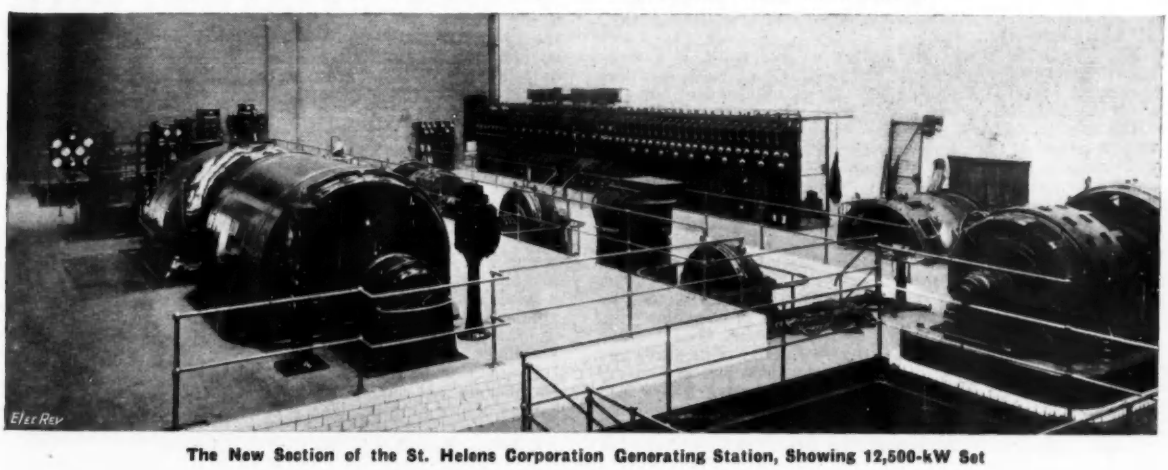
To provide room for the new plant considerable extensions to the existing buildings have been necessary. The steel work was erected by Babcock & Wilcox, Ltd., and E. J. Cooke & Co., Ltd., but all the building foundations and civil engineering work was carried out under the supervision of the works' staff by direct labour.

### Cost of Production

The progressive policy of the Electricity Committee has resulted in continual advancement. St. Helens has for many years been in a very favourable position for low cost of production and efficiency, and at the present time, with an output of thirty-eight and a half million kWh sold, the undertaking stands fourth for lowest cost in the Kingdom, not excluding the large stations with outputs of from one to four hundred million kWh sold. For the year ended March 31st, 1931, a record was achieved, when the cost of production worked out at 0.457d. per kWh sold, notwithstanding the fact that the output was slightly lower than in the previous year. Further, the undertaking was the first in the Kingdom whose average price obtained was less than one penny per kWh, and for the year ended March 31st, 1931, the average price obtained was 0.84d. per kWh.

In preparation for future demands on the distribution system, many miles of cable have been laid in the authorised area of supply, especially in the vicinity of large works. In addition to its area, the Borough of St. Helens Electricity Committee has also obtained powers to supply electricity in the outlying districts of Windle, Eccleston, Crank, Rainford, Bold, and Burtonwood. In all these districts extra-high-voltage mains are laid to steel kiosks, or outdoor sub-stations, placed in convenient central positions, and when new cables are being laid the possibility of demands for power in *all* houses is always borne in mind, the distribution system being designed with this end in view. To meet the demands of the smaller houses an assisted wiring scheme has been inaugurated on an easy deferred-payment system.

Mr. W. S. Johnston, A.M.I.E.E., borough electrical engineer and manager, reminds us that Alderman J. Hewitt, J.P., chairman of the Electricity Committee since 1923 is Mayor-elect of St. Helens for 1931-32.




**The New Section of the St. Helens Corporation Generating Station, Showing 12,500-kW Set**

# Book Reviews

**Talking Pictures and Acoustics.** By C. M. R. BALBI, with a foreword by SIR OLIVER LODGE. Pp. 126; figs. 70. London: E.R. (1930), Ltd. Price 7s. 6d. net.

Practical accounts of talking-picture matters are scarce, and Mr. Balbi's profusely illustrated and comprehensive little work on the subject is most welcome. Mr. Balbi is known for his acoustical work in connection with telephone matters, and has brought sound technical knowledge to bear upon many subjects in talking-picture technique for which dependable information is constantly being sought, both by those engaged in actual experiment and others interested in the work.

Needless to say, the chief methods of both recording and reproducing are dealt with, and details are given of the various types of glow lamps and oscillographs employed in the recording. The Vitaphone, Movietone (Western Electric), British Acoustic, Edibell, R.C.A., and other systems are described at some length, and explanations are made doubly valuable on account of the two chapters on acoustics which follow.

The inclusion of chapters on studios and auditoria are naturally very condensed, but such information as is given is both useful and practical. Kinema power plant is finally discussed, though here again the brief space allotted to the subject makes it impossible to give the reader more than a glimpse of the matter.

The illustrations and diagrams, already referred to, are excellently chosen, and with their help Mr. Balbi has succeeded in making a very useful treatise in a very compact form.

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**Elementary Hyperbolics.** By M. E. J. GHEURY DE BRAY. Vol. I: Pp. xi+351; figs. 86. Vol. II: Pp. xii+209; figs. 35. London: Crosby, Lockwood & Son. Price 7s. 6d. per volume.

This work is a sequel to the author's book on exponentials, and in it he deals with the theory and applications of the hyperbolic functions, and includes a section on complex quantities. The first volume is devoted to theory, and in it are explained the origin and properties of the hyperbolic functions of both real and complex arguments, and the connection of these functions with the rectangular hyperbola. Chapters of special interest are those dealing with the geometrical representation on functions of a complex variable, and with the gudermannian. The second volume deals with the application of hyperbolic functions to map projection and navigation, to the theory of elasticity, and to problems in electrical transmission.

It is somewhat difficult to realise what class of reader the author had in mind when writing this book. On the title page it is stated to be specially adapted to the requirements of beginners, and the opening chapters on complex quantities have undoubtedly been written for elementary students of mathematics. In the later chapters of the book, however, a good working knowledge of the integral calculus is required, while the chapters on the geometry of hyperbolic and gudermannian functions assume a grounding in the elements of conic sections. As the book will appeal primarily to those with a taste for mathematics, the chapter on the geometrical connection of the hyperbolic functions with the hyperbola seems a little laboured, and the use of "iota" and $i$ in the same equation is inclined to be confusing.

The book is a notable addition to mathematical literature, and it will be read with great pleasure by those who have a taste for this subject, provided the colloquial style of the author, first affected by Silvanus Thompson in his famous "Calculus made Easy," does not irritate them. We imagine, however, that even enthusiastic lovers of mathematics will wish that the author could have confined his treatment of a very restricted branch of this subject within the compass of a single volume. The extensive use of the solidus notation for fractions, and the general close-spacing of the mathematical text, render the work more difficult to read than would have been the case had the conventional method of setting this text been adopted.

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**Materials Handbook.** By GEORGE S. BRADY. Second edition. Pp. xxiii+588. London: McGraw-Hill Publishing Co., Ltd. Price 25s. net.

Mr. George S. Brady, the author of this work, is a well-known American specialist in engineering materials, the purchasing of which is a subject not only of importance, but also of considerable complexity and is beset with many pitfalls.

The present volume, which is the second edition of the volume issued in 1928, is a closely printed handbook covering a wide range of engineering construction materials and the more important materials of ordnance. Whilst primarily of value to the purchasing agent and the industrial executive as a quick reference guide, the work is recommended to the designer responsible for production development. After a preliminary section giving a general classification of the materials described, the author proceeds with the main purport of the work, *viz.*, to give in convenient form the chief distinguishing data of the raw materials of engineering construction, the treatment being general rather than particular. The volume concludes with an appendix dealing with units of measure and the standard classifications for marketing iron and steel scrap as adopted by the U.S.A. Bureau of Standards. There is a well arranged index. Some of the definitions given do not convey much to the serious student of modern commercial methods, and a judicious thinning would not be harmful.

The work is excellently printed and well bound in a limp cover. Without offering much that is new, it may still justify itself by methods of presentation and clearness of explanatory matter. The book may, with some reserve, be recommended as a check on information already acquired and to serve as a basis for the acquirement of further knowledge.

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**Grundsätzliches und Tatsächliches zu den Elektrizitätswirtschaften in Europa.** By DR. JOSEPH LEGGE, with introduction by PROF. RUPPERT SCHNEIDER. Pp. xi+206; illustrated. Dortmund: Verlag von Gebruder Lensing. Price Rm.8.70 (about 8s. 9d.).

During recent years repeated proposals have been put forward with regard to the linking up of the various electricity supply undertakings throughout Europe with the object of ensuring both continuous and cheap supplies. It is no doubt due to this fact that Dr. Legge has produced the work before us, in which he deals at great length with the present position of elecricity generation and supply in all the chief European countries, including Great Britain and the Irish Free State. Each country is dealt with separately, particulars being given of the capacities of existing plant, and the water and other power resources, developed and undeveloped, each section being accompanied by a map showing the principal power transmission systems in the particular country. Succeeding chapters are devoted to the economics of the power supply industry, the capital involved, production costs, supply charges and other matters of a financial character. The future demands for power on the part of agriculture and industry are also considered, as well as the question of the possible additional demands arising from railway electrification. The full text is also given, in French and German, of the conventions agreed to by the League of Nations in 1923 with regard to the transmission of electric power from one country to another, and the utilisation of water power in which more than one country is interested.

From an English point of view, one of the drawbacks of the book is the German practice of embodying much of the information in footnotes, a glaring example being a page with but five lines of text.

Although the book only runs to about 200 pages, its compilation must have cost the author a good deal of time and labour. He is, however, apparently an enthusiast on the subject of closer association between the various power supply undertakings and will no doubt regard himself as duly rewarded if his endeavours assist in helping forward the co-operative action he considers necessary in the interest both of undertakers and consumers.

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**Practical Cost Accounts.** By ANDREW MILLER. Pp. xii+64, with 30 forms and graphs. London: Gee & Co. (Publishers), Ltd. Price 8s. 6d. net.

In the world of commerce waste is always a serious menace, and at the present time in particular, when trade conditions are so adverse, manufacturers and business organisers have continually to consider methods by which reduction of waste may be effected. This author aims primarily at demonstrating how a practical system of cost accounting can be made to attack waste in manufacturing businesses, and also enable manufacturers to learn promptly the results of their productive efforts and so make any alterations they may feel necessary to suit varying conditions. The book is clearly written, and there is an appendix containing typical examples of forms and graphs of cost accounting.

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**Practical Radio.** By JAMES A. MOYER and JOHN F. WOSTREL. Fourth edition. Pp. viii+410; figs. 236. London: McGraw-Hill Publishing Co., Ltd. Price 12s. 6d. net.

Several books on radio communication by these authors are well known in the United States. Mr. Moyer is Director of University Extension, Massachusetts, and Mr. Wostrel is Instructor of Radio, University Extension, Massachusetts.

Books on radio become obsolete rapidly, and those who are familiar with "Practical Radio" will welcome this fourth edition, which, by omitting a good deal of matter on the testing of receiving sets, finds place for full information on eliminators, for both a.c. and d.c. supplies. The chapter on television, too, is expanded up to 20 pages, and information is given with regard to the newer types of receiving valves used in America.

All detailed information in connection with apparatus refers naturally to apparatus in use in the United States, and is, therefore, more of academic than of practical interest to British readers, but the book is essentially a practical treatise in accordance with its title. No mathematics are used, and the authors make no pretence to explain fully fundamental principles, so that it is not the sort of book that can be recommended to the novice who hopes to become a wireless experimenter. It will be more useful to the amateur who has already a good hold of principles and wishes to study their practical application to broadcast reception, and for him indeed a mine of information is provided, especially with regard to American practice.

In addition to the chapter on television, there is a chapter on radio transmission, but otherwise the book deals with broadcast receiving circuits. The appendix is a little unfortunate in commencing with the word "Farady," which we hope will not escape detection in the next revision.

# Business and Industrial Notes

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures**

## Silvertown Company to Close Burton Works

In a circular to the shareholders, the secretary of the India Rubber, Gutta Percha and Telegraph Works Co., Ltd. (the Silvertown Company) refers to a previous letter stating that the question of obsolete and redundant plant was receiving the directors' close attention, and says that in the course of dealing with this matter it has become evident that with certain rearrangements at Silvertown, sufficient space will become available at that factory to accommodate the manufactures at present being carried on at Burton. The directors, therefore, after the most careful examination and consideration, are of opinion that there is now no necessity for retaining the Burton factory as a separate unit, and have decided to close it and to transfer the work and necessary equipment to Silvertown. Preparations to this end are now in hand, and when the transfer has been completed the result will greatly facilitate and expedite output, besides effecting a very substantial saving to the company. The directors realise, with regret, that this step is a serious one in that it may tend to increase unemployment at Burton, but they feel that in the shareholders' interests it ought to be taken.

## New Australian Companies

Two new companies recently registered in Australia are Homewood, Barlow & Bertram, Pty., Ltd., electrical engineers and contractors, 411, Lonsdale Street, Melbourne, with a capital of £10,000; and Courtlands Pty., Ltd., suppliers of wireless sets, &c., McEwan House, Little Collins Street, Melbourne, with a capital of £10,000.

## Wages in the Cable-making Industry

In our July 3rd issue we reported that the fall in the cost of living involved a reduction of wages in the cable-making industry on the third pay-day in July. There has since been a rise in the index figure, and the Joint Industrial Council for the Cable-Making Industry informs us that wages will be restored to their former level on the third pay-day in August.

## Indian Electrical Imports

The imports of electrical equipment into India during April last attained a value of £405,000 as compared with £360,000 in the corresponding month of 1930.

## A Report on Jugo-Slavia

A recent memorandum prepared for the Department of Overseas Trade by the Commercial Secretary to the British Legation at Belgrade, states that although the past year was one of great depression and financial strain, the economic situation in Jugo-Slavia is at present more favourable on the whole than that of many other European countries. Reference is made to the determined efforts of Germany to capture the market; German commercial propaganda is more active than ever before and it is notable that directors and managers of important German industries make frequent visits to the country. It is thought, however, that if more adaptability was shown by British merchants and manufacturers they could gain a considerable share of the import trade. The most important openings are to be found in connection with the sale of machinery and equipment of all kinds. During 1930 Jugo-Slavia imported over four million kg. of electrical goods valued at 201.4 million dinars (£730,000).

## Sudanese Duty Reduction

Under a recent Ordinance made by the Sudan Government the import duty on electric generators, motors, transformers and locomotives (weighing not less than 50 kg.) is reduced from 8 per cent. to 6 per cent. *ad valorem*.

## Employment During June

The July *Ministry of Labour Gazette* states that employment in the engineering industry during June showed a decline on the whole and remained bad. In electrical engineering, employment was still slack, although much better than in other sections. The number of unemployed in the engineering industry as a whole on June 22nd was 263,674, representing a proportion of 25.9 per cent. (against 24.6 per cent. in May). The unemployed in the electrical engineering section numbered 13,214, the proportion remaining at 14.7 per cent. There was a slight improvement in the electric cable, wire, and lamp manufacturing group in which the number of unemployed fell to 15,386 and the proportion from 15.3 to 15.0 per cent. On the other hand, the figure for the electrical wiring and contracting industry rose to 3,284, *i.e.*, from 16.3 to 17.7 per cent.

## Norwegian Duty Reduction

The *Board of Trade Journal* reports that the Norwegian Customs authorities have reduced the rate of import duty from 0.35 to 0.30 kr. per kg. on "electric lampholders without switches, cartridges for cut-outs and covers therefor, safety fuse elements for installations and foundation bolts for same, also pin contacts of all kinds and plugs for same."

## New Birmingham Showroom

The Birmingham Electric Supply Department has provided another suburban showroom. This is at Holyhead Road, Handsworth, and the building will be occupied jointly by the Department and the Birmingham Municipal Bank. On Saturday the joint undertakings were formally opened, the bank branch office by Alderman Sir Percival Bower and the electricity showrooms by Councillor H. K. Beale (chairman of the Electric Supply Committee). Mr. Beale stated that this was the fourth suburban showroom to be opened by the Department, and arrangements were being made for the provision of three other branches. He said that last year 30,000 consumers made use of the Department's showrooms for the payment of their accounts, and it is estimated that the number of visitors to the showrooms during that time was 50,000. The consumption of electricity for domestic purposes continued to increase, and the Committee was satisfied that its policy of opening branch showrooms in the district would do much to increase the demands from households for lighting and heating purposes. The turnover of the showrooms last year was about £18,000.

## Chinese Machinery Imports

An article on China's foreign trade during 1930 in last week's *Board of Trade Journal* mentioned that the imports of machinery increased from 29,886,503 Haikwan taels to 44,723,417 taels. The value of electrical machinery is not separately stated but it is reasonable to believe that this class shared in the rise as it has done in recent years.

## Persian Import Quotas

We recently reported that imports into Persia were to be restricted by the Government to quotas fixed in advance. The quotas for the year ending June 22nd, 1932, include the following: Scientific instruments, machinery and tools, locomotives, &c., 5,600,000 gold rials; telegraph and telephone apparatus and accessories, 330,000 gold rials; and electric bulbs and spare parts, 200,000 gold rials. The gold rial is equivalent to a shilling.

## Irish Free State Electrical Imports

A very quiet tone continues to prevail in the electrical trade in the Irish Free State, the imports of machinery and cognate apparatus during April last having amounted to a value of only £52,723, bringing the total for the first four months of the year to £234,473, a decrease of £53,989 as compared with the corresponding period of 1930. Details of the four months' imports are appended:—

| | January-April. 1930. | 1931. |
|---|---|---|
| | £ | £ |
| Electrical machinery ... ... | 94,602 | 65,961 |
| Electric wires and cables ... ... | 59,116 | 37,579 |
| Electric lamps and parts ... ... | 29,530 | 21,217 |
| Wireless sets and parts ... ... | 34,892 | 36,755 |
| Other electrical goods ... ... | 59,840 | 66,118 |
| Copper wires ... ... ... | 10,482 | 6,843 |
| Totals ... ... ... | £288,462 | £234,473 |

## Russian Electrical Production

According to the Moscow newspapers, the production of electrical manufactures during the first half of the current year represented a value of 373 million roubles, or 46.5 per cent. more than in the corresponding period of last year. As compared with the year 1926-27 it is stated that the costs of production have been reduced by 54 per cent. On June 1st the number of workpeople employed in the industry was 83,400.

## Social Events

The head office staff of Messrs. John Shaw & Sons, Wolverhampton, Ltd., held their annual outing on July 11th, the venue this year being Blackpool. The party travelled by rail and on arrival proceeded to Hotel Metropole for luncheon. Fine weather favoured the occasion and after lunch the visitors were left to their own devices.

The Overhead Department of the North Metropolitan Electric Power Supply Co. held its annual outing on July 11th at Southsea. Luncheon was served at the Imperial Restaurant, Portsmouth, and was presided over by Mr. R. T. Bayford, overhead line engineer. Many took the opportunity of visiting the Isle of Wight and other places of interest.

The new pavilion of the Britannia Works (Hopkinson's, Ltd.) Social and Sports Association was formally inaugurated on July 11th by Mr. J. H. Hinchliffe (a director of the company).

The London staff of the Revo Electric Co., Ltd., held their annual outing on July 18th. The party left London by motor coach and travelled to Cliftonville, where lunch was provided, Mr. Alfred Vaughan (director) presiding. Afterwards the company enjoyed themselves according to individual taste and met in the evening for the return journey to London, which was reached by 9.30 p.m.

## New Catalogues and Lists

The RUNBAKEN MAGNETO CO., LTD., Tipping Street, Ardwick, Manchester.—An illustrated and priced folder advertising the "Nivex" pilot lamp.

Messrs. ROBERT DEMPSTER & SONS, LTD., Elland, Yorks.—An illustrated brochure illustrating examples of coal- and ash-handling plants supplied by the company to power stations.

W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, E.C.1.—A well-printed brochure, dealing with "Henley" cables for the electrical equipment of ships. This forms a treatise of some value upon the general subject.

BROOK MOTORS, LTD., Empress Works, Huddersfield.—An illustrated pamphlet (No. 301) containing particulars and prices of the company's "RX" type motors—two- and three-phase. Also a price list of reconditioned motors.

HENDERSON WIRELESS & ELECTRICAL SERVICE, 54, Queen's Road, Brighton.—A 56-page catalogue containing brief details and prices of over 3,000 electrical lines. Illustrated.

JOHN SHAW & SONS, WOLVERHAMPTON, LTD.—A priced folder illustrated in colour describing the company's nickel-plated and enamelled "Trojan" irons.

The STANDARD BATTERY CO., 184-188, Shaftesbury Avenue, W.C.2.—A series of illustrated pamphlets advertising the firm's radio and gramophone equipment, including condensers, potential dividers, loud speakers, and electric gramophone motors.

The EDISON SWAN ELECTRIC CO., LTD., 123-5, Queen Victoria Street, E.C.4.—Catalogue Section C.L. 647 illustrating and describing "Ediswan" floodlight projectors with particulars of the company's services in this direction.

The SOLUS ELECTRICAL CO., 100, Judd Street, W.C.1.—Two booklets dealing respectively with "Solus" X-ray equipment for industrial and commercial purposes and for hospitals.

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38 & 39, Upper Thames Street, E.C.4.—Catalogue No. 492 (superseding No. 427) illustrating and describing "Benjamin" reflector fittings and lighting specialities. Priced.

WATSON & SONS (ELECTRO-MEDICAL), LTD., 43-47, Parker Street, Kingsway, W.C.2.—Two well-illustrated booklets describing in some detail the company's apparatus for X-ray therapy and diathermy. Priced.

HIGGS MOTORS, Witton, Birmingham.—A small poster bearing a message of optimism.

## Trade Announcements

Messrs. BERKELEY & YOUNG, LTD., have acquired the business of Messrs. Chesterton, Jones & Co., makers of "David" irons and "Davidson" heating and cooking apparatus. The combined products of the company, consisting of "Bandy" fans and motors, together with domestic appliances, are now being manufactured in the company's new and extended works at Rushey Lane, Tyseley, Birmingham.

Messrs. H. FEATHERSTONE, LTD., electrical engineers, have appointed Mr. E. B. Parkinson manager of their branch at 135, Week Street, Maidstone. Mr. Parkinson asks for publicity matter and catalogues.

MR. P. BAXTER, electrical and radio engineer, of 6, London Road, Grantham, has opened additional premises at 60, Westgate.

## Recent Contracts

At the King George Hospital, Ilford, which was opened by the King last week, the emergency lighting of the two operating theatres is being provided by batteries supplied by the "D.P." BATTERY CO., LTD., Bakewell, through the electrical contractor Mr. J. Briggs, Store Street, Tottenham Court Road, W.C.1.

The METROPOLITAN-VICKERS ELECTRICAL CO., LTD., in conjunction with the Clyde Crane and Engineering Co., Ltd., have received the order for the whole of the electrically-operated winches for the Cunard ship now being built at John Brown and Co.'s yard at Clydebank.

The three Short "Kent" flying boats used in the Mediterranean by the Imperial Airways have been equipped with the latest electrical type engine speed indicators manufactured and supplied by the RECORD ELECTRICAL CO., LTD.

## For Sale

The Transport Committee of Coventry City Council has for disposal boilers, condensing engine and generator, and economiser.

Gravesend Corporation Electricity Department has for disposal booster sets, arc lamp columns, and d.c. meters.

Messrs. Courage & Co., Ltd., have for sale a 7.5-kW generating set, booster, main switchboard, and a 12-h.p. steam engine. (See our advertisement pages to-day.)

## Price Reductions

The CHLORIDE ELECTRICAL STORAGE CO., LTD., announces that the prices of all its "Drydex" batteries have been reduced as from July 17th.

## Book Notices

"Kingston's Equivalent Tables." London: Kingston's Translations Institute. Price 2s. net each.—These are the first two of a series of four, and they cover, respectively, prices per pound and kilogram, and per yard and metre in the currencies of Belgium, Denmark, Estonia, France, Germany, Holland, Italy, Latvia, Sweden, and Switzerland.

"Scheme for Creating Efficiency in Industry and Reducing Unemployment." By J. B. M'Gillivray. Published by the author, 199, Scotland Street, Glasgow.—Proceeding from the assumption that British industrialists lag behind their competitors in production, plant, and methods, the author puts forward a scheme for a Central Board representative of all the interests concerned, assisted by local boards. The main function of this organisation would be to approve schemes for bringing manufacturing plants up-to-date and guarantee part of the payment for new equipment which would be spread over periods of from three to five years.

"The Engineer's Technical Dictionary, English-French. Price 6s. net. By Mark Lvoff. Pp. 296. London: E. and F. N. Spon, Ltd.

Kempe's Engineers' Year Book for 1931. Revised and edited under the direction of the editor of *The Engineer*. Pp. 3,039; fully illustrated. Price 31s. 6d. net. London: Morgan Brothers (Publishers), Ltd.

"Distribution of Electricity," Vol. III, June 1930 to May, 1931 (bound volume). London: W. T. Henley's Telegraph Works Co., Ltd.

"Practical Radio," by James A. Moyer and John F. Wostrel. Fourth edition. Pp. ix+410; figs. 236. London: McGraw-Hill Publishing Co., Ltd. Price 12s. 6d. net.

"Recording Sound for Motion Pictures." Edited by Lester Cowan for the Academy of Motion Picture Arts and Sciences. Pp. xv+404; illustrated. London: McGraw-Hill Publishing Co., Ltd. Price 25s. net.

The summer number of "Philips' House Magazine," published by Philips's Social and Sports Club, gives an illustrated account of the annual sports day held at the club's ground at Rose Hill, Morden, last month, and contains a number of interesting and amusing articles.

## American Capital in Rumania.

American capital recently obtained an important telephone concession in Rumania. A further advance in that country has now been made. According to a Bucharest correspondent, the Bucharest Municipal Council by a majority of votes has decided to cede the city electricity works for 45 years to the American and Foreign Power Company. The agreement requires the endorsement of Parliament.

## Annual Holidays

The works of BROOKHIRST SWITCHGEAR, LTD., will be closed for the annual holidays from the evening of July 31st to the morning of August 10th. The office will be closed on August 3rd only. A similar notice relating to their Wigan works has been received from Messrs. HEYES & CO., LTD.

BROOK MOTORS, LTD., state that their works will be closed from August 8th to August 15th, inclusive, and urgent correspondence should be addressed to the nearest branch.

## An Important Steelworks Contract

The installation of the plant of the South African Iron and Steel Industrial Corporation in the Pretoria district, which has the support of the Union Government, has made considerable progress. Messrs. Dorman, Long & Co., Ltd., who are the main contractors for the steel works and rolling mills, have now instructed the English Electric Co., Ltd., to proceed with the whole of the electrical equipment. The order, which approaches £150,000 in value, covers the supply of electric motors totalling 86,000 h.p. with transformers, switchgear and cabling on a corresponding scale. The main power supply will be taken to a sub-station at 11,500 V, and will be transformed down to 3,300 V for distribution to the various drives. The sub-station will contain a fourteen-panel, 11,500-V switchboard, two 5,000-kVA transformers to feed the mill equipment, two 2,000-kVA transformers and two 1,250-kW rotary convertor equipments, as well as a large number of auxiliary switchboards and smaller transformers. A second sub-station fed from this centre will contain two 2,000-kVA transformers and two 1,250-kW rotary convertors and auxiliary plant.

For the blooming and rail mills a single-armature motor will be supplied, which will have a cut-out turning moment of 160 metre-tons at any speed from 0/80 r.p.m., corresponding to 18,000 b.h.p. This reversing motor will be supplied from a flywheel motor–generator set having a driving motor of 4,200 h.p., a 33-ton flywheel and three d.c. generators, which will be connected in series to supply the mill motor at 1,290 V. The mill motor will be the largest single armature machine, and the Ilgner set the most powerful yet built by the English Electric Co., Ltd, and the company holds the leading place in the provision of large rolling-mill plant.

For the continuous merchant, bar and rod mill there will be a 1,500-h.p. non-reversing continuous roughing mill motor with a speed range of 300/600 r.p.m., a 1,800-h.p. double armature non-reversing finishing mill motor 500/850 r.p.m., and five 150-h.p. finishing mill motors. All these machines will be started simultaneously by Ward-Leonard control on the two parallel generators of a motor-generator set driven by a synchronous motor of 4,750 h.p. The total capacity of the transformers will exceed 20,000 kVA, and the switchboards will comprise over ninety different panels. The consulting engineers for the electrical equipment are Messrs. Merz and McLellan.

## New Czecho-Slovakian Company

Among the new companies recently promoted in Czecho-Slovakia is the Radiotechna Co., Ltd., Prelouc, with a capital of Kc. 8,000,000. The company is a subsidiary of the electrical engineering concerns of Siemens and Kresl, of Prague, and will produce radio equipment.

The Central Electricity Company, of Prague, proposes to increase its capital from Kc. 60,000,000 to Kc. 90,000,000 to enable it to participate in the erection of power stations on the Vltava.

### The Industrial Position in Sweden

In a survey of conditions in Sweden during recent months, the *Swedish Economic Review* says that no signs of improvement have made their appearance. Industrial employment fell during the first quarter of the year to the lowest level recorded since 1922. The export industries are still suffering most from the depression. As regards the mechanical factories the telephone industry has not been appreciably affected, but the electro-mechanical industry which, up to a few months ago had occupied a favourable position, has experienced a decline in its stock of orders and the number of employés has been considerably reduced. The trade statistics for the first four months of the year show that exports of electrical machinery were valued at 7,274,000 kr. (£400,000), as compared with 11,003,000 kr. (£604,000) in the corresponding period of 1930. At the same time exports of telegraph and telephone apparatus rose in value from 5,072,000 kr. (£280,000) to 5,796,000 kr. (£320,000).

### Aluminium in Shopfitting

This is the title of a brochure just issued by the British Aluminium Co., Ltd. It demonstrates in an attractive way the many uses of aluminium in shop fronts and interiors, exhibition stands, electric signs, &c. One of the stands illustrated is that of the Newcastle-upon-Tyne Electric Supply Co., Ltd., at the North-East Coast Exhibition of 1929—a very effective example.

### New Companies

Messrs. JORDAN & SONS, LTD., the company registration agents, state that during the first six months of this year 4,337 public and private companies were registered, their total capital being £27,729,552. This compares with 4,439 (capital £60,284,623) in the first half of 1930. Under the heading "electricity, gas and water," 176 companies, with a total capital of £1,577,200, are shown; this was the sixth largest group. Only three companies were registered with a capital of £1,000,000, one of them being Lissen, Ltd., the radio manufacturing concern.

In our "New Companies Registered" column during the half-year we gave particulars of 257 concerns formed to carry on businesses of an electrical or closely-allied character. From January to June, 1930, we recorded the registration of 211 concerns.

### Electric Furnace Progress

WILD-BARFIELD ELECTRIC FURNACES, LTD., and G.W.B. ELECTRIC FURNACES, LTD., announce that, as the result of recent developments, they are now in a position to supply certain types and sizes of metallic electric resistance furnaces for working temperatures up to 1,200 deg. C.

### German Electrical Exports

The exports of electrical manufactures from Germany in 1930 are stated to have amounted to 629 million marks, or 29 per cent. of the aggregate world exports of this class (2,167 million marks). The exports were composed as to 23.1 per cent. of lighting appliances, and plant for the transmission of power, including switchboards and protecting devices, as to 18 per cent. of telephone and telegraph apparatus, as to 17 per cent. of machines, and as to 14 per cent. of cables and insulated wires. The principal countries of destination are stated to be Great Britain, which absorbed 19 per cent. of the total exports; the West of Europe, 17 per cent.; the Northern countries, 12 per cent.; and the Eastern countries, 10 per cent., of which Russia represented 5.6 per cent.

### French Foreign Electrical Trade

A return lately issued shows that the imports of electrical machinery, apparatus, and cognate material into France during the three months ended with March last attained a value of £1,396,512 as compared with £1,543,136 in the first quarter of 1930. There was also a decline in the exports of similar material from France during the same period—from £1,064,776 to £993,496. The imports of radio apparatus and components during the three months reached a total of £274,880, as compared with £159,568 in the corresponding period of 1930. On the other hand, there was a decline in exports of this class, from £103,440 to £80,120. The three months' imports of radio valves increased from £101,112 to £112,688, and the exports from £24,305 to £25,824.

### "Tricity" Extensions

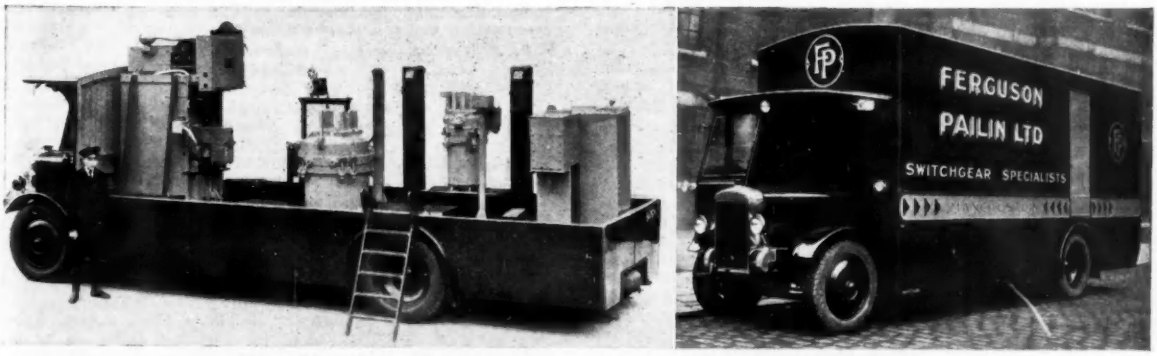
The picture illustrating this note shows the Wellington St. (Waterloo Bridge) and Strand corner block in which the British Electric Transformer Co., Ltd., has had its showrooms and "Tricity" restaurant for some years. The company has lately taken over further space in the building, having secured the whole of the first floor with the exception of the part occupied

**The British Electric Transformer Co. Extends**

by the Sun Life Assurance Society. It has also acquired the shop on the right of the illustration, and an excellent display of "Sunray" and other of the company's domestic appliances has been arranged. The advertisement running round the corner of the block draws attention to the company's premises in a very forceful manner.

### Ferguson, Pailin's New Demonstration Van

Messrs. Ferguson, Pailin, Ltd., have recently put on the road a travelling showroom. This vehicle is mounted on a 35-h.p. Associated Daimler Company overtype chassis, the body having been constructed in its entirety at the F.P. factory. The floor measures 21 ft. by 7 ft.; the overall height of the van is 11 ft., and the overall length 26 ft. The body walls and roof are built up as a removable unit which, when lifted off, permits the gear to be lowered into position with facility. The exhibits are subject to changes in accordance with the requirements of those desirous of making an inspection. A typical equipment includes one "Type 11,000-V VSR20" single bus-bar metalclad unit, with a short-circuit capacity of 250,000 kVA. With the unit is displayed a new type of fabricated circuit-breaker truck, recently developed by the company. A "Type BV" ring-main unit also is included among the exhibits. This unit reduces the floor space occupied by 11,000-V switchgear to a minimum. In addition to these complete units, a number of individual "Type R" breakers are displayed. Among the smaller exhibits there is a section of a control board fitted with lamp-type semaphore indicators; a working model demonstrating the self-aligning features of the "F.P." patented plug-and-socket isolators; compressed chain solenoid operating mechanism; and an ammeter switch. A film-projecting apparatus travels with the van, enabling exhibitions to be given of the film recently taken during a series of short-circuit tests on the company's round-tank breakers. A collection of photographs illustrates the wide range of Ferguson, Pailin's manufactures.




**The "F.P." Van: Exhibits mounted on Chassis, and the Complete Vehicle**

## A Stock Exchange "Panic"

Our Stock Exchange Correspondent tells us how the false news of the reduction of the Bank Rate gained currency. Announcements regarding the Bank Rate are made by means of electric lamps on a board. These are controlled by a metal disc, rather larger than a dinner-plate, held perpendicularly on an attachment that allows the disc to revolve freely. Ten small slots, numbered 0 to 9, appear round the face of the disc, like figures on a clock. Just over the top of the plate is a switch which can be pulled down to slip into any one of the slots denoting the figures. The apparatus had been tested on the morning of the fateful Thursday, and the disc, instead of being left with the 0 placed under the switch, was standing with the slot numbered 4 at the top of the plate. This was not observed. Had the switch slipped into figure zero as it was expected and intended to do, no light would have appeared on the indicators. As it happened that the knife-blade came into notch marked 4, that figure immediately appeared, and gave the signal to scores of clerks who had been waiting to telegraph and telephone the news the world over.

## An Ebonite Display

Redfern's Rubber Works, Ltd., entered a tableau in the industrial and manufacturing section of the Stockport Carnival last week. Although ebonite goods do not lend themselves to artistic arrangement, the company's staff succeeded in making a striking show of their products, which created much public interest. Prominent among the exhibits were "Bulwark" ebonite goods for electrical and chemical works.

## Keat's Home Floodlighted

On the occasion of the opening by the Marquis of Crewe, on July 16th, of the Keat's Museum and Library, at Hampstead, the poet's old home, which adjoins the new museum, was effectively floodlighted by means of "Mazda" lamps.

## Wages in the Electricity Supply Industry

A meeting of the National Joint Industrial Council for the Electricity Supply Industry is to be held in Manchester on Tuesday next (July 28th) to discuss the position resulting from the termination of the existing wage agreement.

## Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

| | CHEMICALS, &c. | Price July 21st. | Fortnight's inc. or dec. |
|---|---|---|---|
| a | Acid, Oxalic ... ... ... per lb. | 5½d. | ... |
| a | Ammoniac, Sal ... ... per ton. | £60 | ... |
| a | Ammonia, Muriate(large crystal) ,, | £52 | ... |
| a | Borax ... ... ... ... ,, | £17 | ... |
| a | Copper Sulphate ... ... ... ,, | £25 10s. | ... |
| a | Potash, Chlorate ... ... ... per lb. | 3d. to 4d. | ... |
| a | ,, Perchlorate ... ... ... ,, | 5½d. | ... |
| a | Shellac T.N.... ... ... per cwt. | £4 5s. | ... |
| a | Sulphur, Commercial ... ... ,, | £11 | ... |
| a | ,, Roll ... ... ... ,, | £11 | ... |
| a | Soda, Chlorate ... ... ... per lb. | 3d. | ... |
| a | ,, Crystals ... ... per ton. | £5 to £5 5s. | ... |
| a | Sodium Bichromate, casks ... per lb. | 3½d. | ... |
| | **METALS, &c.** | | |
| b | Aluminium, Ingots ... ... per ton. | £85 to £90 | ... |
| b | ,, Wire ... ... per lb. | 1/1 to 1/9 | ... |
| b | ,, Sheet and Foil ... ,, | 1/1 to 2/9 | ... |
| b | Babbits Metal and Anti-friction Metals— | | |
| | Grade I ... ... ... per ton net. | £111 | £5 dec. |
| | Grade II ... ... ... ... ,, | £80 | £3 dec. |
| | Grade III... ... ... ... ,, | £47 | £1 dec. |
| c | Brass (rolled metal 2" to 12" basis) per lb. | 7d. | ¼d. dec. |
| c | ,, Tubes (solid drawn) ... ,, | 9d. to 9¼d. | ¼d. dec. |
| c | ,, Wire, basis ... ... ... ,, | 7¼d. | ¼d. dec. |
| c | Copper Tubes (solid drawn) ... ,, | 10d. | ¼d. dec. |
| g | ,, Bars (best selected) ... per ton. | £64 | |
| g | ,, Sheet ... ... ... ,, | £64 | £6 dec. |
| g | ,, Rod ... ... ... ... ,, | £64 | |
| d | ,, (Electrolytic) Bars ... ,, | £38 | £11 12 6 dec. |
| d | ,, ,, Sheets ... ,, | £143 10s. | ... |
| d | ,, ,, Wire Rods ,, | £48 | £11 12 6 dec. |
| d | ,, ,, H.C. Wire per lb. | 6⅞d. | ¼d. dec. |
| f | Ebonite Rod ... ... ... ... ,, | 1/3 to 1/6 | ... |
| f | ,, Sheet ... ... ... ... ,, | 1/3 to 1/6 | ... |
| n | German Silver Wire ... ... ,, | 2/1 | ... |
| h | Gutta-percha, fine ... ... ... ,, | nom | ... |
| h | India-rubber, Para fine ... ... ,, | 4¼d. | ¼d. Inc. |
| i | Iron, Pig (Cleveland No. 3) ... per ton. | 58/6 | ... |
| l | ,, Wire, galve. No. 1, P.O. qual. ,, | £20 | ... |
| g | Lead, English pig ... ... ... ,, | £14 5s. | 10s. dec. |
| g | Mercury ... ... ... ... per bot. | £17 | ... |
| e | Mica (in original cases) small ... per lb. | 6d. to 3/6 | ... |
| e | ,, ,, medium ,, | 4/- to 8/- | ... |
| e | ,, ,, large ... ,, | 8/6 to 17/6 & up | ... |
| p | Phosphor Bronze, plain castings , | 1/1½d. | ... |
| p | ,, ,, drawn bars & rods ,, | 11d. | ... |
| p | ,, ,, rolled strip & sheet ,, | 11¼d. | ... |
| p | ,, ,, wire ... ... ,, | 1/- | ¼d. dec. |
| o | Platinum ... ... ... per oz. | £8 | ... |
| d | Silicium Bronze Wire ... ... per lb. | 9½d. | ... |
| r | Steel, magnet, in bars ... ... ,, | 7½d. | ... |
| g | Tin, Block (English) ... ... per ton | £113 5s. to £114 5s. | £6 5s. dec. |
| n | Wire, Nos. 1 to 16 ... ... per lb. | 2/11d. | ... |

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
r W. F. Dennis & Co.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd
n P. Ormiston & Sons.
o Johnson, Matthey & Co.,
p C. Clifford & Son, Ltd.

## Dissolution of Partnership

CHAPMAN & INMAN, electrical and mechanical engineers, Stockton-on-Tees.—Mr. W. C. Chapman and Mr. H. S. Inman have dissolved partnership. Mr. Inman will attend to debts and carry on the business.

## Bankruptcy Proceedings

**E. C. Little,** radio dealer, &c., lately trading at 38, Palmer Street, Westminster.—The statutory first meeting of creditors was held last week at London Bankruptcy Buildings, a receiving order having been made on July 1st upon a creditors' petition. The statement of affairs submitted showed liabilities of £598, against assets of £33. The debtor stated that in 1921 he formed a partnership under the name of "Delmerick." His partner left the business nine months later and debtor continued it in the name of "The Loud Speaker Co." until he closed down in 1925. In December, 1929, Loud Speaker, Ltd., was formed with a capital of £200 to take over the business. He received 199 £1 shares and was appointed managing director. The company went into compulsory liquidation last June. The debtor attributes his insolvency to adverse litigation. The case was left in the hands of the Official Receiver.

**H. D. Smith,** trading as the "Standard Radio and Electrical Co.," 4a, Alpha Road, Surbiton.—The public examination of this debtor was held at Kingston recently. He stated that his position was due to "lack of capital, and under-estimating the costs of production." He had prepared a statement of affairs which showed a deficiency of £3,128. In 1927 he entered into partnership with another to carry on a radio business in Regent Street, W. This partnership was dissolved within a few months. Two years later debtor transferred the business to a company, of which he was appointed director. Later another company took over the business, and debtor disposed of his shares. Until September, 1930, debtor was in employment, and at that date purchased the business from his employers. The examination was adjourned to enable the debtor to file certain accounts.

**P. S. Brackenbury,** electrical engineer, &c., South End Road, Hampstead, N.W.—The first meeting of creditors was held last week at London Bankruptcy Buildings. The debtor states that in April, 1929, with a borrowed capital of £375, he purchased a business for £100, renovated the premises, and commenced as a radio dealer, purchasing wireless sets and component parts. In 1930 creditors began to press and some issued process for recovery of their debts, involving him in heavy law costs, and in June he filed his petition, two committal orders having been obtained. The liabilities are roughly estimated at £400 against assets of £2. The failure is attributed to lack of capital, general trade depression, and other causes. The case was left with the Official Receiver.

**A. J. Hodges,** 4, Binswood Street, Leamington Spa, electrical engineer.—The first meeting of creditors was held on July 15th, at the Official Receiver's office, Coventry. The statement of affairs disclosed gross liabilities of £1,647, of which £985 was expected to rank for dividend, and net assets of £393, leaving a deficiency of £592. The failure was attributed to lack of capital, bad debts, costs on summonses, and competition.

**H. F. Spence,** trading as H. F. Spence & Sons, 2, Eureka Terrace, Honiton, Devon, electrical engineer.—This debtor's application for discharge was heard on July 15th at Exeter. It was stated that the receiving order was made against the debtor in June, 1930. The main cause of the debtor's position was the failure of a contract with a firm which was to supply him with electrical apparatus. The discharge was granted, subject to a suspension of three months.

**Reginald Ramsden,** 29, Gibbet Street, Halifax, wireless and electrical contractor.—The first meeting of creditors was held on July 14th at the Official Receiver's office, 12, Duke Street, Bradford. A statement of affairs showed ranking liabilities of £230 and a deficiency of £190. Debtor attributed his position to "depression in trade and keen competition." The case being a summary one was left in the hands of the Official Receiver, as trustee. The public examination was held, and closed on July 17th.

**R. E. Lomas,** 24, Tower Street, King's Lynn, trading as "R. E. Lomas & Co.," electrical and radio engineer.—At this debtor's public examination recently a statement of affairs was presented showing gross liabilities of £577, of which £558 was expected to rank, against assets of £132. His position was attributed to "the cessation of a wiring contract in July, 1930, bad debts, keen competition, and depreciation in the value of stock." The examination was adjourned for closing.

**P. A. Franks,** electrical engineer's contractor, 5b, Bedford Square, Loughborough.—Receiving order made, July 14th, on debtor's own petition.

**K. Beeson,** electrical contractor, 46, Main Street, Mexborough.—Receiving order made, July 15th, on debtor's own petition.

**T. E. Jones** (Berrington Jones), electrical engineer, 138, Northgate Street, Chester.—Trustee, Mr. W. F. Small, 5, Hunter Street, Chester, released July 2nd.

**H. C. Scholes** (Scholes Electric Co.), electrician, 72, High Street, Sidcup.—First and final dividend of 3s. in the £, payable July 27th, at the Official Receiver's office, 280a, High Street, Rochester.

**P. M. Braidwood,** electrical engineer, "Holmwood," Lyonsdown Road, New Barnet.—Receiving order made July 8th, on debtor's own petition. First meeting held July 23rd. Public examination September 29th, at Bankruptcy Buildings, Carey Street, W.C.

**A. R. King** (Kingston Radio Co.), wireless dealer, 18, Vernon Street, Newark.—First meeting held July 21st. Public examination September 3rd, at the County Court House, St. Peter's Gate, Nottingham.

## Company Liquidations

**Liverpool Electric Installation Co., Ltd.**—Winding up voluntarily. Liquidator, Mr. C. M. Dolby, 51, North John Street, Liverpool.

**Allands, Ltd.**—Winding up voluntarily. Liquidator, Mr. W. Kingsbury, 4, Walbrook, E.C.

# Electricity Supply

## Lighting, Domestic, Power

**Baildon.**—STREET LIGHTING.—The Urban District Council is contemplating entering into an agreement for lighting the streets by electricity.

**Bedford.**—ELECTRICITY SUPPLY.—The Corporation Electricity Committee is to provide an electricity supply to the village of Houghton Conquest at a cost of £1,107.

**Bredbury and Romiley.**—LOANS.—The Urban District Council has applied for sanction to the following loans for prospective expenditure during the coming financial year: Services, £4,200; meters, £2,905; sub-stations, £5,460; l.p. mains, £2,781; feeder pillars, £100; meter testing equipment, £200; road reinstatement, £700.

**Brighton.**—NEW HEATING RATE.—The Corporation Electricity Committee has decided, subject to certain conditions, to supply electricity for the heating of schools, places of worship and for general industrial and commercial purposes by means of low temperature apparatus, at a flat rate of ¼d. per kWh.

**Canada.**—SEVEN SISTERS FALLS.—The largest power development in Western Canada, the Seven Sisters Falls hydro-electric plant on the Winnipeg river, came into operation last week. The cost of the development was $11,000,000.—*Reuter's Trade Service* (Ottawa).

**Canterbury.**—NEW TARIFF.—The City Council has introduced a new tariff for lighting, under which consumers supplied with e.h.p. current, who guarantee a minimum annual payment of £800 for five years, will be supplied at £6 0s. 10d. per kW per annum, with a "unit" charge of 1d., subject to a coal clause.

**Cardiff.**—YEAR'S WORKING.—We have received from Mr. C. G. Morley New, city electrical engineer, a copy of his report together with the statement of accounts of the electricity undertaking for the year ended March 31st last. The total revenue amounted to £289,257, and working expenses were £152,776, leaving a gross profit of £136,481. The figures for the preceding year were: Income, £273,241; working expenses, £150,876; gross profit, £122,364. To the gross profit was added income from other sources, making £147,510, and after deducting capital charges, &c., there was a net surplus of £39,168, as compared with £22,807 in 1929-30. The sales of electricity increased from 43,638,962 to 44,176,380 kWh, and the maximum load increased by 1,000 kW to 20,271 kW. A new boiler was brought into operation in December last. Additional cables laid amounted to 43.56 miles, making the total mileage, exclusive of service cables, 534.

**Carlisle.**—NEW METERS.—The Corporation Electricity Committee is to apply for sanction to a loan of £5,000 for meters.

ASSISTED WIRING SCHEME.—Sanction has been received to a loan of £5,000 for the assisted wiring scheme.

**Chatham.**—PROPOSED PURCHASE OF UNDERTAKING.—Regarding the question as to whether the undertaking of the Kent Electric Power Co. should be acquired by the Rochester and Chatham Corporations in 1932, under a purchase clause, the Town Council on July 8th agreed that it was still impossible to come to any final decision. It was decided to request the company to furnish certain details and that if this information was not furnished within a reasonable time the Council would approach the Electricity Commissioners.

**Chichester.**—UNDERTAKING NOT TO BE SOLD.—The City Council has decided to take no further steps with regard to the proposed sale of the electricity undertaking. Sanction has been received to a loan of £16,541, part of the sum required for the extension area. Arrangements have been made with the West Sussex County Council for a supply of electricity to the sanatorium at Aldingbourne.

**Colchester.** — ELECTRICITY EXTENSIONS. — The Corporation Electricity Committee is to extend mains and provide two additional transformer kiosks at Tiptree at a cost of £2,616. The engineer has been requested to prepare estimates for the provision of an electricity supply to Boxted.

**Continental.**—FRANCE.—A return lately issued by the French Ministry of Public Works shows that the output during April last of the forty-five principal electricity undertakings in France, representing about 60 per cent. of the country's total production, amounted to 736,774,960 kWh, as compared with 822,257,987 kWh in the corresponding month a year ago, a decline of 11.6 per cent.

ITALY.—The municipal authorities of Turin have lately secured a concession to establish a hydro-electric station to utilise the power of the River Dora Riparia near Salbetrand, Turin Province. It is estimated that about 21,700 h.p. is available.

According to *L'Energia Elettrica* the capacity of the power stations in operation in Italy at the end of April last amounted to 4,360,000 kW, as compared with 4,110,000 kW at the corresponding date of 1930, an increase of 6.11 per cent. Of the total, hydro-electric plants are responsible for 3,588,000 kW and steam and internal-combustion engine stations for 722,000 kW.

SPAIN.—The Republican Ministry of Public Works has completely re-written the "Water Laws" under which Spain is provided with hydro-electric power. Schemes which would cost more than their ultimate value are to be abandoned and the entire programme is to be worked out with a view to assuring the maximum return from a minimum investment. Western and Central Spain and a large part of Portugal will soon be supplied with electric power from the works which are being pushed forward on the River Duero. The River Esla is being dammed immediately above its conjunction with the Duero, and here six turbines, each of 22,000 h.p., will eventually be installed. It is expected that even in drought years the plant will maintain an output of 360,000,000 kWh. This scheme is one of four by which Spain expects to overcome her lack of coal, and to supply towns and industries with cheap power and barren districts with water for irrigation.

**Dunoon.**—EXTENSION OF SUPPLY AREA.—The Dunoon and District Electricity Supply Co. proposes to extend its area of electricity supply so as to include Sandbank and Kilmun.

**East Ham.**—YEAR'S WORKING.—The report of the borough electrical engineer (Mr. W. R. Elliott) on the working of the electricity undertaking for the year ended March 31st last shows a total revenue of £137,053, and working expenditure of £86,393, leaving a gross profit of £50,660. The figures for the preceding year were: Income, £125,710; working expenses, £79,805; gross profit, £45,905. After providing for capital charges and contributing £23,592 from revenue to capital expenditure, there was a net profit of £1,651, as compared with £8,535 in the preceding year. The sales of electricity increased from 13,498,658 to 15,220,587 kWh, and the maximum supply demanded from 6,380 to 7,010 kW. The average price obtained per kWh fell from 2.145d. to 2.064d.

**Great Yarmouth.**—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. P. E. Rycroft) for the year ended March 31st last shows a total income of £121,232, as compared with £107,353 in 1929-30. Working expenses were £46,647, as against £41,022, and the gross profit was £74,585 (£66,332). To the gross profit was added revenue from other sources, making £80,314, and after providing for capital charges, &c., there was a net surplus of £10,123, as compared with £7,008 in the preceding year. The capital expenditure during the year amounted to £69,943, making the total spent on the undertaking £795,870. The sales of electrical energy increased from 12,503,558 to 14,238,941 kWh, and the maximum supply demanded from 6,450 to 6,950 kW.

**Hastings.**—YEAR'S WORKING.—We have received from Mr. A. J. Ryan, borough electrical engineer, a copy of his report together with the statement of accounts on the working of the electricity undertaking for the year ended March 31st last. The total revenue amounted to £134,796, and working expenses were £70,779, leaving a gross profit of £64,017. The figures for the preceding year were: Income, £117,725; working expenses, £61,915; gross profit, £55,810. To the gross profit was added revenue from other sources, making £66,645, and after deducting capital charges there was a net surplus of £12,283, as compared with £3,014 in the preceding year. The electrical energy sold increased from 15,655,172 to 19,367,965 kWh, and the maximum supply demanded from 8,350 to 9,300 kW. An additional boiler and auxiliary equipment were installed at the power station and put into commission in October last, while the work of erecting a new 11,000-V, 3-phase, 500,000-kVA rupturing capacity switchboard is well in hand.

**Hurstmonceux.** — ELECTRICITY SCHEME APPROVED. — The Parish Council has approved the scheme of Major de Roemer for supplying electricity to the parish, and to Hooe and Bodle Street Green.

**Hinderwell (Yorks.).**—ELECTRICITY SUPPLY.—The Rural Council has decided to invite the Newcastle-upon-Tyne Electric Supply Co., Ltd., to discuss the question of the electrification of the district.

**Isle of Thanet.**—TARIFF REVISION.—The Isle of Thanet Electric Supply Co., Ltd., has adopted the following revised tariff: Lighting: Margate and Broadstairs, first 5,000 kWh per annum, 7d. per kWh; next 5,000, 6½d.; next 5,000, 6d.; next 5,000, 5½d.; next 5,000, 4½d.; beyond, 4d. with 1d. extra per kWh for supplies to Westgate and Birchington, less 5 per cent. for prompt payment of accounts. Power: first 5,000 kWh per annum, 3½d. per kWh net; next 5,000, 3¼d.; next 5,000, 3¼d.; next 10,000, 3d.; next 25,000, 2½d.; next 25,000, 2d.; next 25,000, 1½d.; beyond, 1¼d. Heating: first 100 kWh per quarter, 2½d. net; second 100, 2d.; beyond, 1½d. Signs: A special rate of 3½d. per kWh net; after-hours shop window lighting, 3½d. net; meter rentals: Up to 20 amps, 2s. per quarter; above, 2s. 6d.

**Kettering.**—YEAR'S WORKING.—The accounts of the Urban District Council's electricity undertaking for the year ended March 31st last show a total income of £89,294 and working expenditure of £49,517, leaving a gross profit of £39,777; to this was added revenue from other sources, making £41,826 available. Capital charges absorbed £37,016, and the net surplus was £4,810. The sales of electricity totalled 10,219,677 kWh, and the maximum supply demanded was 5,195 kW.

**Kirkcaldy.**—YEAR'S WORKING.—The accounts of the burgh electricity undertaking (electrical engineer: Mr. O. F. Francis) for the year ended May 15th last show a total revenue of £52,081, and working expenditure of £27,153, leaving a gross profit of £24,928. After providing for capital charges there was a net surplus of £4,984. The electrical energy sold decreased from 8,528,041 to 7,329,760 kWh, and the average price obtained per kWh rose from 1.526d. to 1.7d.

**Leicester.**—YEAR'S WORKING.—The report of the borough electrical engineer and manager (Mr. J. Mould) on the working of the electricity undertaking for the year ended March 31st last shows a total revenue of £458,983, and working

expenses of £213,628, leaving a gross profit of £245,355. After providing for capital charges, there was a balance of £144,173, from which contributions to sinking fund were deducted, leaving a surplus of £80,710, of which £10,000 has been allocated to the relief of the rates, as compared with £32,476 in the preceding year. The capital expenditure during the year was £123,517, the chief items being £34,085 for machinery and £49,477 for mains and services. The electrical energy sold totalled 67,860,703 kWh, against 62,928,469 kWh, and the average price obtained per kWh fell from 1.666d. to 1.582d.

**Lincoln.**—TWO-PART TARIFF.—The Town Council has adopted a two-part tariff for houses, the rateable value of which is over £20 a year, but does not exceed £30 a year, which is to remain in operation for one year. The terms are 15 per cent. of the rateable value, plus 1d. per kWh for electricity consumed for all purposes.

**London.**—ISLINGTON.—The Borough Council Electricity Committee is to apply for sanction to borrow £20,000 for further mains extensions as an unemployment relief measure.

HAMMERSMITH.—The Borough Council Electricity Committee is applying for sanction to a loan of £64,400 for mains, substations and switchgear.

HAMPSTEAD. — *Year's Working.* — The accounts of the borough electricity undertaking (engineer: Mr. J. Leadbeater) for the year ended March 31st last show a total income of £188,550, as compared with £170,955 in the preceding year, and working expenses of £141,114, against £131,926, leaving a gross profit of £47,436 (£39,030). After providing for capital charges and making contributions towards capital outlay, there was a net surplus of £5,456, as compared with £4,681 in 1929-30. The capital expenditure during the year amounted to £86,711, the chief item being £44,318 for mains. The electrical energy purchased amounted to 29,056,450 kWh, and the sales increased from 22,427,494 to 25,681,494 kWh. The average price obtained per kWh sold fell from 1.78d. to 1.73d., and the maximum demand rose from 11,770 to 13,500 kW.

STOKE NEWINGTON.—The new sub-station in Wordsworth Road has been completed and will be formally inaugurated by the Mayor on July 27th.

**Loughborough.**—YEAR'S WORKING.—We have received from Mr. S. H. Fowles, borough electrical engineer, a copy of his annual report together with a statement of accounts of the electricity undertaking for the year ended March 31st last. The total revenue amounted to £54,624, as compared with £51,448 in the preceding year, while the working expenditure increased from £31,383 to £31,541. There was a gross profit of £23,083, as against £20,065, and after providing for capital and other charges there remained a net profit of £1,604, as compared with a loss of £719 in 1929-30. During the year £41,438 was spent on capital account, making a total of £299,591 now spent on the undertaking. The sales of electricity rose from 6,507,139 kWh to 7,162,303 kWh, and the maximum demand from 3,700 to 4,300 kW.

**Lowestoft.**—LOANS.—The Town Council has received sanction to a loan of £10,000 for mains and services. The Electricity Commissioners have deferred consent to a further loan of £5,000 for meters until they receive further information regarding the expenditure of the amount previously sanctioned for that purpose. Consent has also been received to a loan of £1,800 for mains and plant for the supply to Oulton. Sanction for overhead lines has been received from the Ministry of Transport.

**Lyme Regis.**—PROPOSED SALE OF UNDERTAKING.—It was reported at the July meeting of the Town Council that since the Council's decision the previous month to dispose of the electricity undertaking for the best offer, seven concerns, mostly in London, but including one at Bournemouth and one at Charmouth, had written asking for information. The Electricity Commissioners had also communicated with the Council and requested that before any further action was taken representatives of the Corporation should meet the Commissioners in London to discuss various aspects of the matter. It was decided to further discuss the matter and that a sub-committee of the Electricity Committee should interview the Electricity Commissioners.

**Oxford.**—PURCHASE OF UNDERTAKING.—The Corporation Electricity Committee has obtained sanction to the borrowing of £475,000 for the purchase of the undertaking of the Oxford Electric Co., Ltd.

**Price Reductions.**—Reductions in the charges for electricity have been made or recommended in the following districts:—

PORTSMOUTH.—Lighting, flat rate: Reduced by ¼d. per kWh; domestic, maximum demand and power tariffs: by ¼d. per kWh.

WOLVERHAMPTON.—Lighting: Flat rate from 4½d. to 4d. per kWh; slot meter supply from 6d. to 4½d. per kWh.

CARDIFF.—Lighting: Flat rate from 3½d. to 3¼d. per kWh, with corresponding reductions in most other rates. Maximum rate for power: From 1½d. to 1-1/16d. per kWh. "All-in" domestic tariff: "Unit" charge during the summer quarters from ¼d. to ½d. per kWh.

OSWESTRY.—Lighting: A reduction of ¼d. per kWh.

DORCHESTER.—Lighting: A reduction of ¼d. per kWh.

PORTLAND.—Power for commercial purposes: 3d. per kWh for the first 75 kWh per quarter per h.p. installed, and 1½d. beyond.

SHOREDITCH.—Lighting: Flat rate from 4d. to 3½d. per kWh; maximum demand rate from 6d. and 2d. to 5d. and 2d.; factory and other special lighting rates: A reduction of 10 per cent.

**Reading.**—PROPOSED PURCHASE OF UNDERTAKING.—The Town Council has decided to apply to the Electricity Commissioners for consent to exercise its right to purchase the undertaking of the Reading Electric Supply Co., Ltd., so that in the event of the Council's ultimately deciding to exercise its option to purchase there may be no delay in giving the required notice to the company.

**South Africa.**—BEAUFORT WEST (CAPE PROVINCE).—The Municipal Council has asked Messrs. Stewarts & Lloyds to inspect the power station plant and to report whether it is possible, at a reasonable cost, to make such repairs and alterations as will enable the plant to be worked for a few years longer. Owing to the business depression, it was considered impossible to proceed with a larger scheme proposed.

JOHANNESBURG.—With regard to the application of the Corporation to the Provincial Administration for permission to raise a loan of £500,000 to provide additions to the municipal power station, the Administrator now suggests that the municipality and the Electricity Supply Commission should again discuss the matter, and that if they cannot come to any agreement the Provincial Executive should appoint an impartial commission to investigate the question.

The Town Council has decided to install an additional 1,000-kW 3-phase convertor at the President Street generating station at an estimated cost of £5,200; and to spend £5,700 on an e.h.p. cable from Jeppe Street generating station to Yeoville sub-station.

KROONSTAD (O.F.S.).—The Town Council has decided to replace the present power station by a new one at an estimated cost of £60,000. A scheme has been prepared by Mr. A. E. Val Davies, consulting engineer, of Johannesburg.

**Special Orders.**—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them to be granted to the Mid-Southern District Utility Co. (formerly the Aldershot Gas, Water and District Lighting Co.) for the transfer of the undertaking authorised by the Midhurst and District Electricity Special Order, 1927, and for other purposes.

The Sussex Electricity Supply Co., Ltd., has applied for a Special Order authorising it to supply electricity in the parishes of Lyminster and Poling in the rural district of East Preston.

**Stretford.**—YEAR'S WORKING.—The report of Mr. T. A. Kerr, electrical engineer to the Stretford and District Electricity Board, for the year ended March 31st last shows a total revenue of £238,921, as compared with £227,291 in 1929-30. Working expenses increased from £156,097 to £165,351, and there was a gross profit of £73,570, as against £71,194. Interest, redemption and other charges, however, absorbed £80,806, and the net result was a loss of £7,235, as compared with a profit of £4,297 in the preceding year. The capital expenditure during the year amounted to £126,717, and included £26,262 for main transmission line, £46,277 for plant and machinery, and £45,457 for mains and services. The sale of electrical energy increased from 67,766,495 to 71,514,387 kWh, and the maximum supply demanded from 21,110 to 23,036 kW.

**Uttoxeter.**—ELECTRICITY SUPPLY.—The Rural District Council has decided to request the Urban District Council to make an effort to fulfil its obligations by giving a supply of electricity to Rocester, as the period of two years will shortly expire. The Council has also expressed its willingness to co-operate with the Urban Council in making a canvass of prospective consumers.

**Walsall.**—METER-READING ECONOMY.—With the approval of the Finance, Gas, and Electric Supply Committees of Walsall, the Borough Treasurer is to direct, for a period of six months, an experiment in the co-ordination of the work of gas and electricity meter readers in two sections of the areas supplied by the undertakings. In one area a gas meter reader will make dual readings at houses served by both gas and electricity and in the other area an electricity meter reader will make dual readings.

**Wartling (Sussex).**—COUNCIL DISAPPROVES OF ELECTRICITY SCHEME.—The Parish Council, after considering the question of electricity supply, has passed a resolution disapproving of the scheme of Major C. W. de Roemer, and expressing the opinion that an application should be made for the revocation of the Special Order of the Weald Electricity Supply Co., Ltd., and that the Electricity Commissioners should be asked to expedite a supply from either Eastbourne or Hastings.

**Whitby.**—LOANS SANCTIONED.—The Urban District Council has received sanction to loans of £2,000 for mains and services, £1,000 for house wiring installations, £2,109 for underground mains, and £582 for plant.

**Wing (Beds.).**—ELECTRICITY SUPPLY.—It was reported at a recent meeting of the Rural District Council that the Electricity Commissioners had intimated that there was a probability of a supply of electricity being available within the next few months for Wing, Ivinghoe, Soulbury, Pitstone, and Stoke Hammond.

**York.**—ASSISTED WIRING INSTALLATIONS, &C.—The Corporation Electricity Committee is to apply for sanction to borrow £8,000 for assisted wiring installations and £45,000 for mains and services.

# Traction

**Australia.**—TRAMWAY DEVELOPMENT.—A return just issued by the Australian Commonwealth Statistician shows that at June 30th, 1930, there were 641 miles of tramways open, eleven miles having been added during the year. Of this total, 572 miles were operated by electricity, 42 by steam, and 26 by sub-surface cable traction, one mile being horse-drawn; 409 miles were under Government control and 185 miles under municipal control, 47 miles being privately owned. The capital cost of the total was £28,596,003; the gross revenue for the year was £7,844,511, and working expenses were £6,408,041.

**Continental.**—ITALY.—According to a *Reuter* message from Rome, leading Italian geologists and engineers have prepared a scheme for the construction of an underground railway for Rome, 35 miles in length. Five lines are to be constructed, with the possibility of two more later. If initiated at once, the scheme will be completed in twelve years.

SWEDISH RAILWAY ELECTRIFICATION. — The complete electrification of the Stockholm-Malmö railway line will be finished in 1933, according to a statement by Mr. Axel Granholm, director-general of the Swedish State Railways. The section is 599 km. long, while the already electrified cross-country line Stockholm-Göteborg has a length of 456 km. Mr. Granholm hopes for the future electrification also of the west coast railway from Göteborg to Malmö, 315 km. long, and the Norrland line, Stockholm to Aange, 616 km. The cost of electrification of the last two lines with locomotives would be 79,200,000 kronor (£4,400,000).

INTERNATIONAL CONGRESS IN HOLLAND.—The annual congress of the Union Internationale de Tramways et de Chemins de Fer d'Interet Local et des Transports Public Automobiles has just been held at The Hague. Among the numerous papers presented at the meetings was one on "The Rational Working of Tramway Systems," by Herr A. Patz, of Bucharest; one by M. L. Bacqueyrisse, Paris, on "Tramway Motors and Recuperation"; one on "Trolley 'Bus Operation," by M. Ch. Harmel, of the Liége Tramways Co.; one on "The Application of Diesel Engines for Traction Purposes," by Herr Quarg, of the Berlin Traffic Co.; and one by Herr Thomas, manager of the Cologne municipal tramways, on "Means of Obviating the Undulatory Wear of Tramway Rails."

**East Ham.**—YEAR'S WORKING.—The accounts of the Corporation tramway undertaking (manager: Mr. W. R. Elliott) for the year ended March 31st last show a total income of £122,343, as compared with £123,358 in the preceding year, and working expenses of £104,233, as against £100,081, leaving a gross profit of £18,110 (£23,277). After payment of capital charges, &c., there was a net deficiency of £11,062, as compared with a loss of £8,206 in 1929-30. The number of passengers carried was 22,961,515, as against 23,565,508, and the car miles run decreased from 2,072,047 to 1,968,435.

**Irish Free State.**—DUBLIN.—According to the *Electric Railway, 'Bus and Tram Journal*, as the latest type of tramcar recently put into service in Dublin has proved satisfactory in operation, it has been decided to construct five more eight-wheel cars and ten four-wheel cars.

**Kirkcaldy.**—YEAR'S WORKING.—The report of the working of the burgh tramway undertaking for the year ended May 15th last (engineer: Mr. O. F. Francis) shows a total revenue of £25,185, as compared with £24,348 in the preceding year. Working expenses were less at £25,416, against £27,408, and the gross deficit was £230 (£3,064). After providing for interest and other charges, there was a net deficit of £5,787, as compared with a loss of £8,631 in 1929-30. The number of car-miles run increased from 480,895 to 483,976, but the number of passengers carried decreased from 4,437,895 to 4,187,580.

**London.**—CAMBERWELL.—The Borough Council has been informed by the Underground Railway Co. that, having regard to the views expressed by the House of Lords, the company has decided that it has no alternative but to drop the proposal for a station on a portion of the open space on Camberwell Green. It is understood that another site next to the Green has been chosen, and that the Bill will be altered and go forward without delay.

**Manchester.**—TRAMCAR TESTS.—The Manchester *Daily Dispatch* reports that tests with a tramcar fitted with a "regenerative control" have just been concluded on Kingsway, Manchester. The tests were made on behalf of all the municipal tramway undertakings in Britain.

**Oldham.** — TRANSPORT AMALGAMATION.—The *Manchester Guardian reports* that the Corporation Tramway Committee is taking action with a view to securing an amalgamation of the tram and 'bus services in the Manchester and district area. Its idea is that a transport board should be set up to deal with 'buses and trams in a large area so as to prevent overlapping and to secure economies in many directions. It has accordingly written to the Manchester Corporation and to Mr. Bernard, of Bolton, secretary of the Lancashire and Cheshire Municipal Transport Association, suggesting that a meeting of local authorities be called to investigate the possibilities of amalgamation. In the opinion of the Committee, the Manchester and district area is a very suitable one for the amalgamation of the different road transport services. It is hoped that in addition to Manchester, such towns as Ashton, Rochdale, Bury, and Bolton would join in the scheme.

# Telegraph and Telephone

**Cable Steamer.**—MISHAP.—The steamship *Retriever*, with a crew of 40, is reported by the Central News Agency to have sunk in the Pacific Ocean, off Valparaiso, Chili, during a storm. According to Lloyds' register this cable ship's port of register is London.

We are glad to learn from a later message that the report of the disaster is incorrect, as the *Retriever* has flashed an "All Well" signal to the cable station at La Serena, north of Valparaiso.

**Germany.**—TELEGRAMS FROM THE AIR.—Arrangements have been made on the Berlin-Vienna airways whereby passengers can send telegrams from aeroplanes while in flight to various places in Germany, Austria, and Czecho-Slovakia. The telegrams must not be in code and are limited to a maximum of fifteen words.

**International Telephony.**—HEAVY TRAFFIC.—Recent political events have resulted in heavy telephone traffic between London and the Continent, especially with Germany. One day last week the excess over the normal reached 25 per cent., the total for the day being over 1,000 calls. The daily average between London and Paris is, however, larger than that figure.

**The Telegraph Service.**—TIME SAVING.—When the wireless and cable services of the Government were transferred to Imperial and International Communications, Ltd., the opportunity was seized to re-organise the headquarters in London, and in the process new machinery has taken the place of those portions which were considered to have grown obsolete. Various delays have been eliminated, and the result has been a speeding up in the receipt and transmission of telegrams at the G.P.O. to and from Continental countries.

**The Telephone Service.**—LONDON AUTOMATIC EXCHANGES.—In a written Parliamentary reply to a question, the Postmaster-General states that the total number of automatic exchanges already working in the London telephone area is 37, and the number of subscribers' lines connected with these exchanges is about 28 per cent. of the total number in the London area. It is hoped to open the following automatic exchanges in London during the next 18 months:—Whitehall, Southall, Acorn (Acton), Prospect (Barnes), Hampstead, Perivale (Castlebar), Byron (S. Harrow), Bayswater, Merton Abbey, Mayfair, Hither Green, Regent, Tulse Hill, Wordsworth (Kenton), Langham, Grosvenor, Bethnal Green, and Bowes Park.

# Radio

**France.**—TWO INVENTIONS.—General Ferrié recently read two communications to the Academy of Sciences, the first one from the inventors of a triode valve capable of being dismantled and of dealing with a power of 150 kW. The filament consists of eight separate wires parallel to each other. The second communication, says *World-Radio*, was from Mr. Bélin, in which he described a method of transmitting photographs in such a manner that no one but the possessor of a receiving machine specially adapted for the purpose could receive them. At fixed intervals signals of a deliberately confusing character are transmitted, which destroy the picture except when received on a machine which has been previously synchronised with the transmitter.

**Licences.**—FURTHER INCREASE.—At the end of June British receiving licences in force numbered 3,780,689, an increase of 69,747 on the May figure. Free licences issued to blind people added a further 24,074, which represents an increase of 863 compared with the previous month.

**Switzerland.**—LEAGUE OF NATIONS STATION.—The additional buildings necessary for housing the League of Nations wireless station have been completed. The installation of the transmitters were to begin on July 20th, and the station is expected to be ready for operation on November 1st.

**United States.**—TELEVISION STUDIO.—On the eighty-fifth storey of the Empire State Building, a thousand feet above Fifth Avenue, New York, the National Broadcasting Company is installing complete television equipment with antennæ on top of the building's mooring mast, 1,250 feet above the street level. The company's engineers believe that the new equipment will help to overcome many of the difficulties previously encountered in visual broadcasting, and after a year of experiments develop it sufficiently for public use. Work in the studio will be begun as soon as an experimental licence can be obtained from the Federal Radio Commission.—*Reuter's Trade Service* (New York).

VALVE PATENTS. — The decision of the American Supreme Court against the Radio Corporation of America in two suits involving patent rights to the de Forest and Langmuir valves inferentially questioned the legality of about 1,400 licences held by R.C.A. The independent valve manufacturers at once petitioned the Federal Radio Commission not to renew the R.C.A. licences, but the Commission ruled that the Corporation had not been found guilty of unlawfully monopolising radio communication. The Commission reached its decision by a three to two majority. The majority drew a sharp line of distinction between monopolistic control of communication and control of certain apparatus (in this case vacuum tubes), no claim having been advanced that a monopoly of valves was of "such magnitude as to stifle communication."

# Contract Information

*When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below*

## Contracts Open

**Australia.**—MELBOURNE.—September 15th. Posts and Telegraphs Department. Instrument cords. (A.X. 11023.)*

**Ayr.**—County Council. Electric lighting of 54 houses. Schedules from Mr. Wm. Reid, county architect, 14, Wellington Square.

**China.**—CHINESE GOVERNMENT PURCHASING COMMISSION.—L.p. cable and d.c.c. copper wire. (July 17th.)
Frequency changer. (See this issue.)

**Dumfriesshire.**—August 14th. County Council. Supply and erection of 33-kV and 11-kV overhead distribution lines. (July 17th.)

**Denmark.**—COPENHAGEN.—July 28th. Municipal Electrical Department. One 1,500-kW automatic mercury rectifier.

**Dartford.**—August 1st. Urban District Council. Electric wiring, fittings and lamps at Heath Lane housing estate. (See this issue.)

**Edinburgh.**—July 29th. Town Council. Heating installation and electrical installation at Gorgie School gymnasium. Schedules from city architect; tenders to Town Clerk.

**Egypt.**—CAIRO.—August 24th. Ministry of the Interior. Electric lighting installation for the town of Akhmim, near Sohag. (A.X. 10970.)*
August 3rd. 600 meters of various kinds for Menond and Kafr-el-Cheikh. (A.X. 11004.)*
August 13th. One 40-kVA and one 20-kVA air-cooled three-phase transformers for Zifta Municipality. (A.X. 11001.)*
August 20th. Two step-down power transformers of 50 kVA and accessories for the Assiout power station. (A.X. 10985.)*
September 2nd. 125-kVA motor generator, Diesel engine, switchboard, &c., for Delta Barrage spinning factory. (A.X. 10984.)*

**Galashiels.**—July 30th. Town Council. Electrical work at Wood Street housing scheme. Schedules from J. & J. Hall, architects, Galashiels; tenders to Town Clerk.

**Glasgow.**—August 5th. Corporation. Electrical installation at Stirling's and Kinning Park Libraries. Specifications, &c., from office of Public Works; offers to Town Clerk.
August 12th. Gas Department. Static condensers. (July 10th.)

**India.**—SIMLA.—August 4th. Indian Stores Department. Electric lamps for the period October 15th, 1931, to October 14th, 1932. (A.X. 11010.)*
August 17th. Oil engine driven d.c. generating set, rotary balancer and electrically-driven centrifugal pumps. (A.X. 11026.)*

**Inverkeithing.**—Town Council. Electric lighting at housing scheme. Schedules (£1 1s. deposit) from Mr. R. H. Motion, architect, Union Bank Chambers, High Street, Dunfermline.

**London.**—CENTRAL ELECTRICITY BOARD.—August 10th. 35-kV switchgear at Padiham and Burnley for North-West England and North Wales Electricity Scheme. (July 17th.)
COUNTY OF LONDON ELECTRIC SUPPLY CO., LTD.—August 10th. Supply and erection of a 33-kV overhead line in Kent. (July 17th.)
August 24th. Transformers in connection with the extensions to the Barking power station. (See this issue.)
L.C.C.—August 24th. High-pressure steam and circulating water pipes, de-superheating plant, electrically-driven circulating water pumps, strainers, &c. (See this issue.)
ISLINGTON.—September 9th. Borough Council. Laying distributor cables and earthenware pipes in certain thoroughfares. (See this issue.)

**New Zealand.**—WELLINGTON.—August 28th. Post and Telegraph Department. 500 microtelephone handles. (A.X. 10980.)*
September 2nd. 100 telephone bell gongs. (G.X. 10562.)*
September 3rd. Telephone transformers transmitters, earpieces, mouthpieces, &c. (A.X. 11007.)*
September 8th. 1,000 three-way telephone plugs. (A.X. 11006.)*

**Northern Ireland.**—ATHLONE.—September 2nd. Urban District Council. Supply, erection and maintenance for 12 months of three centrifugal water pumps with electric motors and switchgear. (See this issue.)
BELFAST.—August 12th. Electricity Board for Northern Ireland. L.p. distribution systems in Comber and Newtownards, Co. Down. (July 17th.)
August 17th. Sub-station equipment, including transformers, switchgear, meters and distribution boards. (July 17th.)

**Panama.**—Diesel-electric generating plant developing from 100 to 125 h.p. (G.X. 10521.)*

**Siam.**—BANGKOK.—August 15th. Post and Telegraph Department. 33,000 metres of coil-loaded underground armoured cable for combined services, including picture transmission, broadcasting, telegraphy and telephony. (A.X. 11022.)*

**South Africa.**—KLERKSDORP.—August 7th. Municipal Council. Power station and distribution network. (A.X. 10983.)*
CAPE TOWN.—July 22nd. City Electricity Department. Two 15-kW, and two 1-kW generator sets. (A.X. 11024.)*
August 5th. Ironclad switchgear. (A.X. 11027.)*
JOHANNESBURG.—August 20th. Municipal Council. Electricity meters and time switches. (A.X. 11035.)*

**Turkey.**—ISTANBUL.—August 22nd. Administration of Posts, Telegraphs and Telephones. 100,000 metres of field telephone cable. (A.X. 11017.)*

**Uruguay.**—MONTEVIDEO.—August 5th. State Electricity Works. Transformers. (A.X. 11008.)*

**Walton-on-Thames.**—July 30th. Urban District Council. 10,250 yards of e.h.p., h.p. and l.p. cables, including trenching and temporary reinstatement. (July 17th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Contracts Closed

**Barnard Castle.**—Guardians' Committee. Accepted:—
Installation of electric lighting at the Teesdale Institution (£184).—Kelly & Co.

**Beckenham.**—Urban District Council.
CORRECTION.—In our issue of July 10th we stated that the contract for the electrical heating installation in the new municipal buildings had been awarded to Messrs. Young, Osmond & Young, Ltd. Actually Messrs. Young, *Austen* & Young were the successful tenderers.

**Blairgowrie.**—Town Council. Accepted:—
Conversion of street lighting from gas to electricity.—Reid and Partners.

**Canterbury.**—City Council. Accepted:—
E.h.p. switchgear (£332).—Ferguson, Pailin, Ltd.
3-phase transformers (£382).—Hackbridge Electric Construction Co., Ltd.
Distributing board (£86), disconnecting boxes and covers (£35).—W. T. Henley's Telegraph Works Co., Ltd.
Underground cables (£781).—Standard Telephones & Cables, Ltd.

**Croydon.**—Electricity Committee. Recommended:—
Coal-handling plant (£7,195).—Underfeed Stoker Co., Ltd.
Sewerage Committee. Recommended:—
Electric crane and grab (£590).—Taylor & Hubbard.

**Government Contracts.**—The following contracts were placed by the various Government Departments during June:—
ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).
Electric cables.—Derby Cables, Ltd.; Edison Swan Cables, Ltd.; Hackbridge Cable Co., Ltd.; British Insulated Cables, Ltd.; Enfield Cable Works, Ltd.; General Electric Co., Ltd.; W. T. Glover & Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; India Rubber, Gutta Percha and Telegraph Works Co., Ltd.; Johnson & Phillips, Ltd.; Macintosh Cable Co., Ltd.; St. Helens Cable and Rubber Co., Ltd.; Siemens Bros. & Co., Ltd.
Overhead electric crane.—Wharton Crane & Hoist Co., Ltd.
A.c. and d.c. motor generators.—Crompton Parkinson, Ltd.
Wire measuring gear.—Telegraph Construction and Maintenance Co., Ltd.
520-h.p. motor.—Crompton Parkinson, Ltd.
Electric winches.—Stothert & Pitt, Ltd.
WAR OFFICE.
Secondary batteries.—Pritchett & Gold and E.P.S. Co., Ltd.
AIR MINISTRY.
Condensers.—Muirhead & Co., Ltd.
Direction finding station.—Marconi's Wireless Telegraph Co., Ltd.
Receivers.—India Rubber, Gutta Percha & Telegraph Works Co., Ltd.
Telephone receivers.—Telephone Mfg. Co. (1929), Ltd.
Transmitters.—Marconi's Wireless Telegraph Co., Ltd.
W/t valves.—A. C. Cossor, Ltd.
CROWN AGENTS FOR THE COLONIES.
Cables.—W. T. Henley's Telegraph Works Co., Ltd.; Standard Telephones & Cables, Ltd.
Copper wire.—F. Smith & Co.
Switchgear.—Ferguson, Pailin, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.
Telephone apparatus.—Ericsson Telephones, Ltd.
Train lighting spares.—J. Stone & Co., Ltd.
POST OFFICE.
Telephonic apparatus.—Ericsson Telephones, Ltd.; Siemens Bros. & Co., Ltd.; Standard Telephones & Cables, Ltd.; Telephone Manufacturing Co. (1929), Ltd.
Wireless apparatus.—Edison Swan Electric Co., Ltd.; Standard Telephones & Cables, Ltd.
Cable.—British Insulated Cables, Ltd.; Connollys (Blackley), Ltd.; General Electric Co., Ltd.; Hackbridge Cable Co., Ltd.; Standard Telephones & Cables, Ltd.
Telephone cords.—London Electric Wire Co., & Smiths, Ltd.; Phœnix Telephone & Electric Works, Ltd.; Standard Telephones & Cables, Ltd.
Galvanometers.—India Rubber, Gutta Percha & Telegraph Works Co., Ltd.
Rectifiers.—Edison Swan Electric Co., Ltd.; Westinghouse Brake & Saxby Signal Co., Ltd.
Time switches.—Gent & Co., Ltd.
V.i.r. wire.—General Electric Co., Ltd.
Electric lifts.—Evans Lifts, Ltd. (Money Order Department, N.7); W. Wadsworth & Sons, Ltd. (Chester station sorting office).
Power plant.—Southampton telephonic repeater station.—Haslam & Newton, Ltd. Sub-contractors: Alton Battery Co., Ltd., for batteries. Wigtownshire telephonic repeater station.—Standard Telephones & Cables, Ltd.; sub-contractors: Alton Battery Co., Ltd., for batteries; Crompton Parkinson, Ltd., for generators and motors; Walter Jones & Co. for dynamotors.
Telephone exchange equipment.—London telephone exchanges: Automatic Telephone Manufacturing Co., Ltd. Preston (Lancs.), Reliance (London), Hanley, Macaulay, Birmingham North, Flaxman (London), Epsom, and Coventry: General Electric Co., Ltd. Gladstone (London), Hampstead, Shepherd's Bush: Ericsson Telephones, Ltd. Western (London), Whitehall (London), Gulliver (London), Ardwick (Manchester), Hove, Edinburgh, Brighton, Leicester, and Swansea: Siemens Bros. & Co., Ltd.
H.M. OFFICE OF WORKS.
Panel heating at Geological Museum.—R. Crittall & Co., Ltd.
Victoria and Albert and Science Museums (control panels, batteries, &c.).—Chloride Electrical Storage Co., Ltd.

**Great Yarmouth.**—Town Council. Accepted:—
Automatic traffic signals (£217).—Revo Electric Co., Ltd.

**Lamp Contracts.**—The British Thomson-Houston Co., Ltd., has received an order from the Port of London Authority for three months' supply of vacuum and gasfilled lamps.

The Metropolitan Water Board has placed a repeat contract with Siemens Electric Lamps & Supplies, Ltd., for 12 months' supply of gasfilled lamps.

**Lichfield.**—Town Council. Accepted:—
Switchgear for the Alrewas sub-station (£288).—Crompton Parkinson, Ltd.

**London.**—L.C.C.—Highways Committee. Accepted:—
Cable work in connection with the installation of ventilation plant at Rotherhithe tunnel (£1,419).—Electrical Installations, Ltd.

Housing Committee. Accepted:—
Wiring and fittings for electric lighting in three blocks of dwellings on the Stockwell (Clapham Road) site (£1,459).—City Electrical Co.

Electric lighting installation in houses on Clapham Park estate (£1,511).—Hall & Stinson, Ltd.

LEWISHAM.—Works Committee. Recommended:—
Electric motors for highways depôt.—A. J. Hewens & Sons.

CITY CORPORATION.—General Purposes Committee. Recommended:—
Electric lighting at gas meter testing office (£62).—Electrical Installations, Ltd.

**Manchester.**—Public Health Committee. Accepted:—
Installation of automatic internal telephones at the Abergele Sanatorium.—General Electric Co., Ltd.

Education Committee. Accepted:—
Electrical installation at Birley Street Council school extensions.—S. H. Heywood & Co., Ltd.

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# Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

SMITH VAILE pump spares.

HENLEY BURROWES d.p. automatic switchplug.

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# Notes

## The Faraday Centenary and the Schools

We are glad to learn that the proposal to organise visits by older school children to the Faraday Centenary Exhibition in London next September is to be acted upon. The chief education officer of the London County Council has announced that the L.C.C. is arranging a scheme of scholars' visits to the Albert Hall similar to the suggestion made by Mr. A. Easteal, chairman of the Poplar Electricity Committee, in our issue of July 3rd, page 28. The L.C.C. is also arranging, in conjunction with the organisers of the exhibition, to have a booklet issued to teachers to be used as a basis for lessons on Faraday's life and work prior to the exhibition. There seems no reason why this effort of the L.C.C. should not be copied by other education authorities.

## Faraday Centenary: Masonic Dinner

At the Café Royal, Regent Street, on Saturday September 26th, Electric Lodge No. 2087 will hold a special meeting in association with other technical lodges to which all Masons are cordially invited and also visitors who are in London for the I.E.E. Faraday celebrations. An address dealing with the life of Faraday will be given by W. Bro. Michael Faraday, P.G.O. Tickets (one guinea) can be obtained from the Secretary of the Electric Lodge, W. Bro. E. J. Willcox, 73, Basinghall Street, E.C.2.

## Welding Competition

The success of last year's competition was such as to induce the Institution of Welding Engineers again to offer its gold medal and a prize of ten guineas for a paper on "Welding and Cuttingon Railways and Tramways." Particulars are obtainable from the secretary, 30, Red Lion Square, London, W.C.1.

## Appointments Vacant

Temporary jointer for l.p. work for Skipton Urban District Council.

Lady demonstrator for Aylesbury Electricity Department.

Electrical engineer and manager for Gainsborough Urban District Council.

(See our advertisement pages to day.)

## B.S.S. for Coal Sampling and Analysis

The work of the preparation of British Standard Specifications for the Sampling and Analysis of Coal and Coke, which was begun in 1927 at the instance of the Department of Scientific and Industrial Research has been brought a stage nearer completion by the recent issue of the British Standard Specification for the Sampling and Analysis of Coal for Inland Purposes (B.S.S. No. 420-1931). This specification should be read in conjunction with the report by Dr. E. S. Grumell and Dr. A. C. Dunningham on the Sampling of Small Fuel up to 3 in. —(B.S.S. No. 403) issued in December of last year—as the report embodies some general principles of sampling, the explanation in regard to which is important as supplying justification for the comparatively speaking small samples specified in the specification.

Copies of this specification, which we hope to review more fully in the near future, can be obtained from the British Engineering Standards Association, Publications Department, 28, Victoria Street, London, S.W.1, price 2s. 2d., post free.

## Model Engineering Exhibition

Enthusiasts who devote their spare time to the pastime of model engineering will compete for the championship of Great Britain at the forthcoming "*Model Engineer*" Exhibition at the Royal Horticultural Hall, London, which will be open from September 3rd to 12th; in addition, there will be sixteen other cups and prizes for models of all sorts. The Exhibition takes place towards the end of the school holidays, and it is one of the finest educational exhibitions held in the country. Last year it attracted 30,000 visitors.

## Fatalities

John Hulme Bailey, aged 15, received a fatal electric shock on July 16th, while on holiday in Liverpool. He was playing cricket in a yard when the ball went over a shed. The boy climbed on to the edge of a water-barrel and came into contact with an electric light wire.

Winifred Robus, an 11-year old girl of Abergarwed, when falling from a shed at Yuisarwed Colliery, Neath, Glamorgan, grasped an electric wire and was killed.

## Floodlighting London

Londoners had a foreglimpse this week of what Westminster will look like in September, when the triennial International Illumination Congress meets for the first time in England. Elaborate plans are being made to illuminate the River Thames Embankment and to floodlight prominent buildings in the metropolis and other cities to be visited by the delegates. On Tuesday evening last tests were carried out of portions of the London scheme, and at about 10.30 p.m. the Queen Victoria Memorial in front of Buckingham Palace, St. James Park, parts of Westminster Abbey and the Houses of Parliament, including the "Big Ben" clock tower, were illuminated.

"Big Ben" was floodlighted white, its opal face being made to appear pink by the use of amber lamps at the back of the clock. Twelve "Holophane" prismatic projectors were employed, of 1,000 watts each, and special lenses were employed to spread the light in conjunction with the rectangular beam. The same type of equipment and wattage were used for Westminster Abbey.

## Artificial Carbon Electrodes

During the past decade a considerable increase has taken place in the demand for artificial carbon for the production of electrodes for electrolytic smelting, for electro-thermic purposes, the production of carbide, &c., mainly due to the extension of this process in the metal industry, especially in the production of copper and aluminium. In Germany it is stated that the growing requirements have been met exclusively by the foreign oil industry, which produced so-called petrol coke on a large scale from the residue resulting from the distillation of mineral oil. It is estimated that the European demand for petrol coke amounts to 120,000 tons per annum, of which the consumption in Germany ranges between 30,000 and 35,000 tons per annum. Of this quantity the United States has supplied, in recent years, about 85 per cent. and Poland about 15 per cent., the latter being said to be a less valuable product made in Galicia.

After having overcome initial failures, a correspondent of a Frankfort newspaper states that about a year ago success attended the efforts made in Germany to start on an economic basis the carbonisation of pitch. In the first place 25 coking ovens at Lothringen colliery were reconstructed for the carbonisation of pit-coal tar pitch. This branch of the tar industry is claimed to have been favourably developed, and also in the lignite industry it has been possible to undertake the carbonisation of lignite tar. So far, it is calculated that the production of pitch coke from pit-coal tar amounts to about 15,000 tons per annum, to which may be added small quantities made from lignite tar. The German pitch coke is claimed to be technically and chemically of equal quality to the American petrol coke; its use necessitates a change-over in the process from the soft petrol coke to the hard pitch coke. As a result of the present capacity it has been possible to substitute petrol coke by pitch coke to the extent of 50 to 60 per cent of the imports of the former. The production of pitch coke is stated to have already had a favourable effect on the pitch market in Germany, as it has enabled the large stocks to be considerably reduced, which was necessary owing to the decreased demand for pitch due to the falling production of pit-coal briquettes.

## Standard Specification for Radio Apparatus

An important specification of direct interest to all manufacturers and users of "battery eliminators," trickle chargers, mains-operated wireless sets, and radio-gramophones has just been issued by the British Engineering Standards Association under the title of "British Standard Specification for Mains Supply Apparatus for Radio and Acoustic Reproduction." The specification applies to all devices (with certain specified exceptions) intended for supplying current and/or voltage not exceeding 500 to apparatus employing thermionic valves for radio and acoustic reproduction and similar purposes wherein the energy is derived from alternating-current public or private supply mains. It applies equally to such devices

whether they are incorporated in a common container or cabinet with the radio or amplifying apparatus, or whether they are constructed and used separately from it. In the former case the complete apparatus comes within the scope of the specification. Amplifiers used in connection with "talkie" installations and public-address systems in which the anode voltage usually exceeds 500 do not come within the scope of the specification, but it is important to note that all "mains supply apparatus," even the smallest "battery eliminator" used for broadcast receivers and "all-mains" portable receivers, are to be regarded as electrical power apparatus and as coming within the provisions of all rules and regulations relating thereto issued by competent authorities.

The specification is divided into five main parts and three appendices, dealing respectively with the scope of the specification, definitions, electrical characteristics, marking, design and construction, specification of flexible cords and cables, measurement of output "hum," and definition of "quality." The latter definition is of particular interest, as the specification indicates a method of assessing the performance of the apparatus as regards freedom from residual ripple voltage (or "hum"). The specification also deals with the subject of voltage regulation, a common fault with many "battery elinimators" in the past having been the rapid falling-off in output voltage as the anode current increased.

It should be noted that this specification, while covering a certain amount of ground at present dealt with by the I.E.E. Wiring Regulations, is in no way in conflict therewith, the Committees responsible for the preparation of the specification and the Regulations, respectively, having worked in close collaboration.

### B.S.S. for Varnished Cloth Sheet, Strip, or Tape

British Standard Specification No. 419-1931, which has just been issued, relates to yellow and black varnished cotton cloth as used for the insulation of electrical machinery and apparatus. The two types can frequently be used for the same purpose, but apart from appearance, which may be of importance in determining which colour is adopted for a particular purpose, there are certain well-defined differences between the yellow and black materials, and they are clearly set out in the specification. Dimensions and tolerances thereon, the requirements as regards joins, rolling and packing, electric strength, tensile strength, tearing strength, ageing, and methods of testing are fully described.

Copies of the specification (No. 419-1931) may be obtained from the publications department, British Engineering Standards Association, 28, Victoria Street, S.W.1, price 2s. 2d. each post free.

### Carborundum

It is of interest to recall that the late Mr. Edward Goodrich Acheson, whose death was announced in our issue of July 10th, while endeavouring to reduce iron ore with natural gas, noticed that clay objects placed within his furnace became impregnated with carbon and seemed to have become harder as a result. In an attempt to carry out the impregnation of clay in a more efficient manner, in 1891, he placed an intimate mixture of clay and coke in an iron bowl, such as is employed by plumbers for melting lead. He wound a wire around the bowl and connected it to a small dynamo. By plunging a carbon rod into the mixture within the bowl and carrying a wire from its to the other terminal of the dynamo he completed a circuit and then started the generator. The coke-clay mixture between the carbon rod and iron bowl offered resistance to the flow of current, causing the electrical energy to be converted into heat. After, the bowl was removed from the circuit and permitted to cool. The grayish mass did not appear to have changed and Acheson, keenly disappointed, was about to consider the experiment a failure. Suddenly, his attention was drawn to a few bright specks in the mixture near the carbon rod which he observed possessed a definite crystalline structure. Upon drawing a particle across a piece of glass he was impressed by the ease with with it cut. Further tests showed the crystals to have a hardness approaching that of diamonds and were capable of serving as an unusually efficient abrasive. Acheson thought his new product was a combination of carbon and corundum, and called it "Carborundum." Although chemical analysis later showed this unique material to be a combination of carbon and silicon, the original name was retained and to-day thousands of tons are produced in furnaces at Niagara Falls for world consumption.

### Flame Lamp Research Association

The Flame Lamp Research Association, Ltd., was registered on July 13th as a company limited by guarantee without share capital, with 100 members each liable for £10 in the event of winding up. The objects are to protect the interests of manufacturers of and dealers in flame, electric, and other lamps in the British Empire and Ireland, to register a trade mark, to provide for the examination of lamps, parts of lamps and incidental appliances in respect of origin, mode of manufacture, quality or other characteristics, &c. The management is vested in a committee. The first officers are:—Messrs. A. L. Johnson (president), E. A. Hailwood (vice-president), and D. Wenham (secretary). Solicitors: Frank E. Smith & Hayward, Winchester House, Victoria Square, Birmingham. The registered office is at 25, Temple Row, Birmingham. The file number is 257,788.

# Another Turbo-electric Ship

## The P. & O. Co.'s new liner "Strathaird" was launched on Wednesday last week

FOLLOWING the launch of the *Strathnaver* on February 5th, the second of the two ships ordered by the Peninsula and Oriental Steam Navigation Co. from Vickers-Armstrongs, Ltd., early in 1930 was launched from their naval construction works at Barrow-in-Furness on July 18th.

The *Strathaird*, with the *Strathnaver* at present being fitted out at Barrow, will make a most notable addition to the P. & O. fleet, and both ships will be engaged in service between the United Kingdom, Australia, and intermediate ports.

The main general dimensions of the vessels are: length 664 ft., breadth 80 ft., gross tonnage 22,000, draft 29 ft., speed 22 knots, and shaft h.p. 28,000. They will each have accommodation for 498 first-class passengers, 668 tourists, and a crew of 476.

These graceful all-white ships have straight stems raked forward, two masts, three streamlined funnels, and cruiser sterns. The hull is subdivided by 12 watertight bulkheads and the doors can be operated by either hand or electric power, the latter ensuring instantaneous closing from the bridge in emergency. The rudder is operated by electro-hydraulic steering gear with telemotor and automatic steering control from the bridge and mechanical control from the docking platform aft. The deck auxiliaries include a high-powered electric windlass with extended ends for warping. Two electric warping capstans are also fitted forward and two aft. Electric drive is also used for the cargo winches and the boat-hoisting winches.

The ships are electrically lighted throughout by power plant consisting of three turbo-generators of 750 kW and one of 400-kW capacity, and advantage has been taken of electricity for heating the galley cooking ranges, bakers' ovens, and other kitchen and pantry gear.

An inter-communicating telephone system, with electric megaphones, where required, is installed in all the principal working parts of the vessel, and kinema and music loud-speakers for all passengers.

The main propelling machinery consists of two separate turbo-alternators, each with its own condensing plant and auxiliaries, supplying power to two low-speed synchronous motors coupled direct to the twin propeller shafts, with contactor control. Variation of propeller speed in either direction is obtained by varying the turbine speed, and direction of rotation of the propeller is changed by reversing the connections of two of the three phases leading from the alternators to the motors, which is accomplished by means of contactors operated by levers located on the control platform.

The main propelling equipment may be classified in three sections, as follows: two B.T.-H.-Curtis turbo-alternator sets, maximum rated at 10,700 kW, 3,000 r.p.m., 3,000 volts, 3-phase; Two synchronous propulsion motors, each of 14,000 s.h.p., 125 r.p.m., 3,000 volts, 3-phase; one control apparatus group and also the necessary balancer booster sets and ventilating fans.

For each propeller three coutrolling levers are provided for operating contactors and speed settings of the turbine governor, with a direction lever, field lever, and speed-controlling lever, all mechanically interlocked to ensure correct operation. The whole of the control cubicle is "mistake-proof," and special keys make incorrect switching impossible.

The steam-generating installation consists of four "Yarrow" high-pressure water-tube boilers of the five-drum double-flow, side-fired type, fitted with superheaters and tubular air preheaters, working at a pressure of 400 lb. per square inch. The steam is superheated to 725 deg. F. Two auxiliary boilers are to be provided of similar design, and all burn oil fuel only under the "Howden" forced-draught air duct system. The oil-fuel installation consists of two duplex units, electrically driven, for the main boilers and one simplex unit for the auxiliary boilers.

The two main condensers are of the "Weir" regenerative type having a total cooling surface of 32,000 square feet, sufficient to maintain a vacuum of 28 inches with a sea temperature of 82 deg. F.

Apart from those auxiliary services already mentioned, electricity is used for operating such navigation instruments as the sounding machine, the direction finder, and submarine signalling gear; also for refrigerating fruit and other cargoes; for the cooling of wines and table delicacies, the 15,000 candle-power searchlight (which throws a beam 3,600 feet ahead of the ship), general heating, lighting, and ventilation, the luminous and silent cabin-bell system, movie-tone apparatus, the ship's telephone and radio systems, and floodlights for use on festive occasions. By the same agent the swimming baths receive water from the sea on tap night and day, hot and cold water, fresh and salt; and twin streams of hot and cold air which can be mixed at will in public rooms and passengers' cabins by the touching of a button to any desired temperature.

# Our Personal Column

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements**

**Mr. T. E. Kay,** A.S.A.A., has just retired from the position of secretary to the Lancashire Electric Power Co. after more than thirty years' service. Mr. Kay had been identified with the growth of the company since its inception. He helped to guide it successfully through the many difficulties and setbacks which confronted the youthful power supply industry during the opening years of the century. At a farewell function in the company's offices last week Mr. Kay was presented with an engraved silver tray and a gramophone by Mr. C. D. Taite, manager and director of the company, on behalf of the staff. Mr. Taite expressed the company's regret at the retirement of so valuable and popular an official of the company. Mr. Kay is succeeded in the position of secretary by **Mr. S. M. Rix,** A.S.A.A., whose portrait is reproduced with these notes.

**Mr. S. M. Rix, the new Secretary of the Lancashire Electric Power Co.**

**Mr. W. S. Barclay,** until recently general secretary of the British Empire Trade Exhibition, Buenos Aires, has been appointed general manager of the Argentine Chamber of Commerce in Great Britain, which has recently moved to River Plate House, South Place, E.C.2.

**Mr. H. G. Fraser,** city electrical engineer, Wakefield, is recommended for the appointment of city electrical engineer of Oxford at a salary of £1,150, plus £80 per annum car allowance. It will be remembered that the Oxford Corporation recently acquired the city electricity undertaking from the Oxford Electric Co., Ltd.

**Mr. E. H. Bryant,** representative of the Mullard Wireless Service Co., Ltd., in the Eastern Counties, sustained head and leg injuries in a recent flying accident. It is expected that he will be on the sick list for some weeks.

**Mr. C. J. Roberts** is recommended by the Hammersmith Electricity Committee for the position of showroom superintendent at a salary of £260 per annum.

**Mr. M. G. Wallace,** B.Sc., has joined Messrs. Elliott Brothers (London), Ltd., in the capacity of sales representative for the company's heat economy and control apparatus.

**Mr. T. W. Shorrock,** electrical and wireless engineer, Barnoldswick, initiator of the radio relay system in Barnoldswick, was married to Miss C. Shorrock on July 18th.

**Mr. H. G. Harrison,** gas manager, has been appointed manager of the gas and electricity undertakings of the Ashbourne Urban Council at a salary of £350 per annum, with gas, house, and coal.

**Miss Megan Lloyd George,** M.P., has consented to her appointment as vice-president of the North Wales branch of the Electrical Association for Women.

The result of the ballot to fill the vacancies which will occur in the Council of the Institution of Electrical Engineers on September 30th next is as follows:—President: Captain J. M. Donaldson, M.C.; vice-presidents: Mr. J. M. Kennedy and Mr. F. W. Purse; hon. treasurer: Mr. E. Leete; ordinary members of Council: (Members) Lt.-Col. A. G. Lee, O.B.E., Mr. C. le Maistre, C.B.E., Mr. H. A. Ratcliffe, and Mr. E. H. Rayner, Sc.D.; (Associate Members) Mr. R. H. Schofield and Mr. J. W. J. Townley; (Companion) Viscount Falmouth.

The officers of the Meter and Instrument Section for the year 1931-32 are as follows:—Chairman: Mr. F. C. Knowles; ordinary members of Committee: Messrs. G. A. Cheetham, E. Fawssett, F. E. J. Ockenden, B. A. Robinson, and E. E. Sharp.

**Mr. E. J. Fox,** of the Stanton Ironworks Co., Ltd., is the president of the newly-formed British Works Management Association, which is an organisation composed of individuals (not companies) providing for the exchange of experience among those actually engaged in solving the day-to-day problems of industrial production.

**Mr. G. Hurford,** director of manufacture to Standard Telephones & Cables, Ltd., is chairman of the Council of the Association, and **Mr. A. P. Young,** O.B.E., manager of the Rugby works of the British Thomson-Houston Co., Ltd.

**Mr. A. B. Powell,** assistant manager to the English Electric Co., Ltd., has joined the outside staff of Messrs. Armstrong, Whitworth & Co., Ltd., his interests lying mainly in the development of Diesel-electric traction.

**Mr. D. W. M. Hutchison,** chief electrical engineer and inspector, Kuala Lumpur, has been appointed acting Director of the Electrical Department of the Federated Malay States during the absence on leave of the Director, Mr. W. J. Williams.

**Mr. G. Graham,** managing director of Associated Battery Makers of Australia, Ltd., is at present on a visit to England. He is expected to return to Australia by the end of the year.

**Mr. E. Hitchcock,** general manager of the Christchurch Municipal Electricity Department, and **Mr. F. Thompson,** general manager of the city tramways, are on a visit to America and Europe to inspect electrical and transport systems.

The *Morning Post* reports that **Sir Hugo Hirst,** Bt., and Lady Hirst arrived this week in Paris, where they are staying a few days before proceeding to Aix-les-Bains.

**Alderman H. B. Vorley,** J.P., who was recently elected to the Council of the Incorporated Municipal Electrical Association, has been re-elected chairman of the Conference of Local Authorities Owning Electricity Undertakings in Greater London for the seventh time.

**Mr. J. N. Ferguson** and **Mr. E. D. McPhail** are the directors of Telford, Grier, Mackay & Co., Ltd., whose formation is recorded in the "New Companies Registered" section of this issue.

## Obituary

**Mr. J. T. Baron.**—We learn with regret that Mr. J. Thomas Baron, borough electrical engineer of St. Pancras, passed away suddenly at the age of 69 years on July 16th. He had been at the St. Pancras electricity works for more than forty years. Three years before the late Mr. Sydney Baynes was appointed "chief," Mr. Baron was engaged as engineer during the construction stage; supply was commenced in November, 1891. When Mr. Baynes retired in 1927 Mr. Paron became chief of the undertaking to which he had devoted practically the whole of his career. He had been a member of the Institution of Electrical Engineers since 1891. He was a man of retiring disposition. A memorial service was held on Wednesday at St. Pancras Church and the funeral took place at Great Baddow.

**Mr. S. F. Walker.**—Mr. Sydney F. Walker whose death was referred to in our issue of July 10th (p. 72) will be remembered as the proprietor of the Cardiff Electrical Works between thirty and forty years ago. He was later the author of a number of electrical books including: "Electric Mining Machinery"; "Coal-cutting by Machinery in the United Kingdom"; "Electricity in Homes and Workshops"; and "Electric Wiring for Plumbers and Gasfitters."

**Mr. C. G. Foster.**—The death is announced, at the age of 74 years, of Mr. C. G. Foster, who was from 1902 until his retirement in 1927 superintendent of the Croydon Corporation Tramways.

**Mr. W. Gledhill.**—The death is announced, at the age of 65 years, of Mr. William Gledhill, traffic superintendent of the Huddersfield Corporation Tramways. He had been associated with the undertaking since 1892.

**Mr. W. J. Radley.**—The death occurred recently of Mr. W. J. Radley, who for 31 years was a member of the staff of the Cardiff Electricity Department. He retired in February last.

**Mr. R. Bickerton.**—We regret to report the death of Mr. Richard Bickerton, director of the National Gas Engine Co., Ltd., which occurred in a London nursing home on July 17th.

**Mr. G. J. Massey.**—In our last issue we reported the death of Mr. George J. Massey, engineering manager at the Erith works of Callender's Cable and Construction Co., Ltd. Mr. Massey, whose portrait appears herewith, was 53 years of age. He was a Lancashire man and after preliminary training he joined the inspection-department of Callender's in 1902. Later he went into the drawing office and after a period in charge of this office became assistant to the engineering manager Mr. E. Loam. He succeeded the latter in 1930. Mr. Massey was a member of the Engineering and Allied Employers' (London and District) Association. He was actively interested in the athletic and social side of the Erith works and rendered valuable assistance to the Callender Athletic and Social Club as representative on the executive committee of the management and senior staff. The funeral took place at Erith Cemetery on Friday last week.

**The late Mr. G. J. Massey, engineering manager at Callender's Erith works**

**Will.**—The late **Mr. George Fitzbrown,** managing director of the Broughton Copper Works (1928), Ltd., left estate valued at £53,292 (£53,070 net personalty).

# Financial Section

**New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares**

## New Companies Registered

**Harris & Co. (Bude), Ltd.**—Private company. Registered July 14th. Capital, £3,000 in £1 shares. Objects: To acquire the business of an electrical and radio engineer now carried on by W. C. Crothers, at 30, Queen Street, Bude, as "F. T. Harris & Co." The permanent directors are: W. C. Crothers, 30, Queen Street, Bude. J. A. F. Gill-Martin, 4, Fairfield Road, Bude. E. E. Harris, 1, Belle Vue Avenue, Bude. Solicitors: Peter, Peter and Sons, Bude.

**G. H. Smallwood & Co., Ltd.**—Private company. Registered July 14th. Capital, £15,000 in £1 shares. Objects: To acquire the business of electrical, mechanical and radio engineers, &c., carried on by G. H. Smallwood and C. G. Smallwood in partnership at Shrewsbury, Ludlow, and Church Stretton, Salop, under the styles of "G. H. Smallwood & Co." and "Samuel Smallwood." The first directors are: G. H. Smallwood, 6, Milk Street, Shrewsbury, electrician (chairman); C. G. Smallwood, "Withnoe," Armoury Gardens, Shrewsbury, electrician. Secretary: J. H. Gibbins, 15, College Hill, Shrewsbury.

**H. E. Emery & Colclough, Ltd.**—Private company. Registered July 16th. Capital, £300 in £1 shares. Objects: To carry on the business of electrical contractors and general electrical engineers, &c. The first directors are: A. E. Colclough, Kingsley, Southlands Avenue, Wolstanton, Stoke-on-Trent; H. E. Emery, 64, Lower Street, Newcastle, Staffs., engineer (permanent managing director).

**Telford, Grier, Mackay & Co., Ltd.**—Private company. Registered July 11th, in Edinburgh. Capital, £2,500. Objects: To acquire certain of the assets, patents and other rights and the goodwill of Telford, Grier & Mackay, Ltd. (in voluntary liquidation), 16, Carrick Street, Glasgow, to carry on the business of engineers, electricians, lamp makers, workers in brass, &c. The directors are: J. N. Ferguson, 43, Cleveden Road, Kelvinside, Glasgow, and E. D. McPhail, 18, Edgemount Gardens, Langside, Glasgow, engineer. Registered office: 59, Finnieston Street, Glasgow, C.3.

**Wireless, Gramophone and Electrical Trades Association, Ltd.**—Private company. Registered July 17th. Capital, £100 in £1 shares. Objects: To act as general reference and inquiry bureau to the manufacturing, wholesale and retail wireless, gramophone and electrical traders of England and Wales. The first directors are: S. W. Taylor, "Normandale," Warren Road, Banstead, Surrey, company director; Winifred L. Jones, 117, Putney Bridge Road, S.W.15, company secretary. Registered office: 50-51, High Holborn, W.C.1.

**Safe-Beam Lamp, Ltd.**—Private company. Registered July 4th. Capital, £10,000 in £1 shares (6,000 7½ per cent. preference, 2,000 "A" and 2,000 "B"). Objects: To adopt an agreement with W. C. Howard and W. H. Lund for the purchase of any patents relating to the production, manufacture and use of electric or other lamps on mechanically-propelled motor cars, cycles, bicycles and other vehicles, &c. The directors are: W. C. Howard, 10, Charlotte Road, Edgbaston, Birmingham, and W. H. Lund, 10, Grape Street, Shaftesbury Avenue, W.C.2. Solicitors: Alfred & W. H. Green, 109, Colmore Row, Birmingham.

**J. L. Hills Manufacturing Co., Ltd.**—Private company. Registered July 20th. Capital, £200 in 1s. shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in all kinds of electrical and mechanical apparatus, machines and instruments and component parts thereof, &c. The permanent directors are: J. D. Haines, 193, Brooke Road, Upper Clapton, E.5; W. C. Taylor, 182, Clapham Road, S.W.9, engineer; J. L. Hills, 19, Barrington Road, S.W.9, electrical engineer. Registered offices: 8, Gladstone Street, Vauxhall, S.W.8.

**B. M. and A., Ltd.**—Private company. Registered July 20th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of, agents for and dealers in all kinds of sound-reproducing instruments and machinery (electric or otherwise), electrical and other instruments, appliances and components in connection with wireless telegraphy, &c. The permanent directors are: C. Berrage-Moulton, 2, Lambolle Road, N.W.3; L. D. Allman, Oak Cottage, Dean Row, Wilmslow; E. R. Pears, 17, Redcliffe Square, S.W.10; R. B. Wedd, 46, High Street, Chorlton-on-Medlock, Manchester. Secretary: R. B. Wedd. Registered office: Dean Row Road, Wilmslow, Cheshire.

## Returns of Electrical Companies

**Semarks (1931), Ltd.**—Particulars filed of first debentures for sums not exceeding at any one time £1,500, and of second debentures for sums not exceeding at any one time £1,560, authorised June 20th, 1931, charged on the company's property, present and future, including uncalled capital, the amounts of the present issues being £1,500 and £1,560, respectively.

**H. D. Douglas & Co., Ltd.**—Capital, £1,000 in £1 shares. Return dated December 29th, 1930 (filed April 29th, 1931). 2 shares taken up. £2 paid. Mortgages and charges, nil.

**Walter Denis Manufacturing Co., Ltd.**—Capital, £500 in £1 shares. Return dated December 31st, 1930 (filed May 1st, 1931). 261 shares taken up. £2 paid. £259 considered as paid. Mortgages and charges: £1,850.

**Johnson and Murrell Electric Co., Ltd.**—Capital, £5,000 in 4,000 ordinary and 1,000 preference shares of £1. Return dated December 31st, 1930 (filed April 1st, 1931). 1,000 preference and 2,200 ordinary shares taken up. £1,700 paid on 250 preference and 1,450 ordinary shares. £1,500 considered as paid on the remainder. Mortgages and charges, nil.

**C. A. Sothers, Ltd.**—Particulars filed of debentures for sums not exceeding £1,200 at any one time, authorised July 7th, 1931, charged on the company's undertaking and property, present and future, including uncalled capital (if any) and goodwill, the amount of the present issue being £1,000.

**Etherwave, Ltd. (formerly Sympor & Evershed, Ltd.).**—Particulars filed of debentures for sums not exceeding £300 at any one time, authorised June 25th, 1931, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £300.

**Parmiter, Hope & Sugden, Ltd.**—Mortgage dated July 6th, 1931 (supplemental to mortgage dated August 15th, 1922, and charge dated May 10th, 1923), further securing £3,000, charged on certain lands, houses and a machine shop in Longsight, Manchester. Holders: S. Ross, Fernroyd, Gore Crescent, Weaste, Salford, and R. Turner, 1, Booth Street, Manchester.

**C. H. Sowerby, Ltd.**—Debenture dated June 30th, 1931, to secure £400, charged on the company's undertaking and assets. Holders: Magnetos Lunfer S.A., 14, Route de St. Julian Caronge, Geneva. Debenture dated June 30th, 1931, to secure £1,000, constituting a second floating charge on the undertaking and assets of the company. Holders: Picard Pictet & Co. (London), Ltd., 58, Compton Street, Goswell Road, E.C.1.

**Artic Fuse and Electrical Manufacturing Co., Ltd.**—Capital, £5,000 in 4,700 ordinary and 100 deferred ordinary shares of £1 and 4,000 founders' shares of 1s. each. Return dated December 31st, 1930 (filed April 24th, 1931). 2,433 ordinary, 100 deferred ordinary and 1,933 founders' shares taken up. £2,079 13s. paid on 1,983 ordinary and 1,933 founders' shares. £550 considered as paid on 450 ordinary and 100 deferred ordinary shares. Mortgages and charges, nil.

**Allerton Electrical Supplies, Ltd.**—Capital, £2,000 in £1 shares. Return dated May 1st, 1931. 1,500 shares taken up. £1,500 paid. Mortgages and charges: £1,400.

**Electrical Importers (Hull), Ltd.**—Capital, £205 in £1 shares. Return dated December 30th, 1930 (filed May 14th, 1931). 4 shares taken up. £4 paid. Mortgages and charges: £1,000.

**Orford Electric Light and Power Co., Ltd.**—A. D. Wykes, of 67, Watling Street, E.C.1, was appointed receiver by Order of Court dated June 18th, 1931.

**Veritys, Ltd.**—Satisfaction to the extent of £200 on June 30th, 1931, of second debentures authorised April 13th, 1931, and registered April 28th, 1931. (According to the register of mortgages, the debentures registered April 28th, 1931, originally secured £60,000.) Issue on June 30th, 1931, of £200 debentures, part of a series already registered.

**Polo Battery Manufacturing Co., Ltd.**—Capital, £1,000 in £1 shares. Return dated December 31st, 1930 (filed March 31st, 1931). 1,000 shares taken up. £1,000 paid. Mortgages and charges, nil.

**Edward Deane and Beal, Ltd.**—Capital, £60,000 in 20,000 preference and 40,000 ordinary shares of £1. Return dated October 17th, 1930 (filed April 21st, 1931). 20,000 preference and 20,009 ordinary shares taken up. £9 paid. £40,000 considered as paid. Mortgages and charges, £5,750.

**Adamson, Green & Co., Ltd.**—Satisfaction to the extent of £250 on June 25th, 1931, of mortgage dated October 3rd, 1930, and registered October 7th, 1930. Debenture dated June 26th, to secure £200 and any sums not exceeding £800 for which the chargee may become liable under a guarantee to Lloyds Bank, Ltd., charged on freehold premises in Back Fox Street, Felling, motors and other moveable effects and the company's undertaking and property, present and future, including uncalled capital and goodwill. Holder: J. P. Graham, Hillcroft, Stocksfield-on-Tyne.

**Hadden & Pearce, Ltd.**—S. H. Gillett, of 24, Basinghall Street, E.C.2, was appointed receiver and manager on June 25th, under powers contained in debenture dated April 19th, 1928.

**Power, Light & Heat, Ltd.**—Particulars filed of debentures for sums not exceeding £500 at any one time authorised June 18th, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £200.

**Hodgson & Beckett, Ltd.**—Capital, £2,500 in £1 shares. Return dated July 5th, 1930 (filed April 13th, 1931). 2 shares taken up. £2 paid. Mortgages and charges, nil. A return of allotments made up to December 9th, 1930 (filed April, 1931), shows a further 618 shares allotted as fully paid pursuant to purchase agreement.

**Simpler Wireless, Ltd.**—Capital, £1,250 in 1,000 preference shares of £1 and 5,000 ordinary shares of 1s. Return dated December 31st, 1930 (filed March 7th, 1931). All shares taken up. £1,000 paid on the preference shares. £250 considered as paid on the ordinary shares. Mortgages and charges, nil.

**H. H. Hornsey, Ltd.**—Capital, £1,000 in £1 shares. Return dated December 1st, 1930 (filed May 8th, 1931). 625 shares taken up. £282 paid. £343 considered as paid. Mortgages and charges, nil.

**Money-Hicks, Ltd.**—Capital, £500 in 475 10 per cent. cumulative preference shares of £1 and 500 ordinary shares of 1s. each. Return dated December 31st, 1930 (filed May 20th, 1931). 348 preference and 6 ordinary shares taken up. £330 6s. paid (being £1 per share on 330 preference and 6 ordinary shares). Nil called up on 18 preference shares. Mortgages and charges: £140.

# City Notes

## Kalgoorlie Electric Tramways, Ltd.

The annual meeting was held on July 16th, Mr. C. C. Baker (chairman) presiding. In presenting the report and accounts (ELEC. REV., July 17th, p. 114) the chairman said the granting of the gold bonus should enable many mines to resume work at a profit. This activity would mean the employment of men, and as they now carried the miners, they would hope to reap a benefit from it. Kalgoorlie had every appearance of reviving, and should this be so, they could reasonably look for an increasing traffic, and to take advantage of this they would have to spend money on maintenance and renewals. They had hoped to be able to announce at the meeting some particulars of the amount required, but certain negotiations were proceeding which might affect the position, particulars of which could not be gone into at the moment. The results for the current year were encouraging, the operating profit for the first three months being £1,077. The report and accounts were adopted.

## United Dominions Trust, Ltd.

Speaking at the annual meeting on July 21st, the chairman (Mr. J. Gibson Jarvie) stressed the need for manufacturers and traders to avail themselves of the facilities which were available for the financing of long-term credits if they were to sell their goods under the prevailing conditions. He said that in addition to the credit facilities offered to the engineering, motor and allied trades, the parent company now undertook the financing of the renovation or modernisation of existing buildings, private or commercial. A subsidiary company had been formed to finance the installation of every kind of electrical equipment, from the wiring of the humblest cottage to plant for the largest factory. When the grid scheme was in full operation there would undoubtedly be a demand for current from quarters where electricity had hitherto been only a word. The company was ready and organised against that time.

## Marconi's Wireless Telegraph Co., Ltd.

The report for the year ended December 30th last states that the profits of Imperial and International Communications for 1930 amounted to £326,248. To profit has been added £200,000 transferred from general reserve, making £526,248 available, out of which a dividend of £525,000 (1.75 per cent.) is being paid by the Communications Co. The proportion received by the Marconi Co. amounts to £77,206, and after crediting this amount, the accounts of the latter company show a net profit of £212,336, as compared with £796,235 for the two years 1928 and 1929. The directors recommend a dividend of 10 per cent. on the ordinary shares (against 15 per cent), leaving £31,788 to be carried forward (against £38,966). Meeting: July 29th.

## Companies Struck Off the Register

The undermentioned companies have been struck off the Register, and are thereby dissolved :—

Adey Wireless, Ltd.
British Illuminated Signs, Ltd.
Radi-Arc Electrical Co. (1927), Ltd.
Wireless Fabrics, Ltd.

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**Venezuela Telephone and Electrical Appliances Co.**—The accounts for the year ended June 30th last show a profit of £18,823, as compared with £70,364. To this is added £47,294 brought in, making £66,117 available. The directors recommend a dividend of 8 per cent., less tax, on the ordinary and "A" ordinary shares, leaving £40,640 to be carried forward. As reported in our last issue, the company's Venezuelan property has been transferred to a local company. The profit for the year does not include any distribution from the local company in respect of the period January 1st to June 30th last.

**Parkinson and Cowan, Ltd.,** report that the net profit for year ended March 31st last was £25,319, as compared with £88,114 in 1929-30. To this was added £28,810 brought in, making £54,129 available. The directors are unable to recommend a final ordinary dividend, and after meeting the preference dividend, the carry-forward is £7,974. The report states that the company has suffered severely from the general economic depression, which has resulted in a considerable reduction in the output of its subsidiaries.

**The Dubilier Condenser Co. (1925), Ltd.,** reports a loss of £20,918 for the year ended March 31st last, as against a loss of £3,915 in the preceding year. It is stated that changes in the lines of production and their volume have reduced the effective values of capital assets considerably below the figure of £291,333 at which they stand in the balance sheet. The business of the company has fallen off both in volume and in value. Meeting: July 28th.

**The Great Northern Telegraph Co.'s Holding Co., Ltd.,** reports that for the year ended June 30th last the dividend on the shares of the Great Northern Telegraph Co., Ltd., held by the holding company, amounted to £100,000, representing 20 per cent. on 50,000 shares of £10 each. Accrued interest amounted to £2,265, as compared with £2,321 last year. After providing for taxes, &c., it is proposed to pay a dividend of 20 per cent., leaving £653 to be carried forward. Meeting: July 31st.

**Falk, Stadelmann & Co.** show a profit of £93,645 for the year ended March 31st last, as compared with £107,495 for the preceding year; to this is added £25,085 brought in, making £118,730. It is proposed to maintain the ordinary dividend at 7½ per cent. to write off the balance of goodwill of gas mantle undertakings (£10,290), and to carry forward £25,095. Meeting: July 30th.

**J. & E. Hall, Ltd.,** announce that in view of the continued depression of trade, they have decided that it is not in the best interests of the company to pay any interim dividend on the ordinary shares.

**The East African Power and Lighting Co.** reports a profit for 1930 of 1,512,085s., including the amount brought forward, as compared with 1,334,797s. for 1929. The ordinary dividend is maintained at 7 per cent., general reserve receives 140,000s., and it is proposed to carry forward 39,745s. The company has obtained sanction to develop further hydro-electric resources, and the construction work will be commenced as soon as conditions are favourable.

**The Wolseley Sheep Shearing Machine Co., Ltd.,** reports a net profit of £3,746 for 1930, as compared with £11,646 in 1929. A dividend of 5 per cent. is recommended (against 7½ per cent.), leaving £8,509 to be carried forward.

**The Ross Electric Light and Power Co., Ltd.,** in its report for the year ended December 31st last, shows a profit of £1,697, as compared with £1,561 in the preceding year. After providing for debenture interest, &c., the deficiency is increased by £3 to £6,273. At December 31st the number of consumers was 423, with a total equivalent of 14,307 30-watt lamps connected.

**The Telephone and General Trust, Ltd.,** reports that the subscription list in connection with the issue of 240,000 7 per cent. cumulative preference shares of £1 each, which was made on July 15th, has been closed, and underwriters have been required to take up approximately 30 per cent. of their commitments.

**W. and T. Avery, Ltd.,** show a net profit of £104,270 for the year 1930-31, as compared with £119,482 in the preceding year. Reserve receives £13,451, and the ordinary dividend is maintained at 15 per cent. Meeting: July 28th.

**Herbert Morris, Ltd.,** have declared dividends for the half-year to July 31st on the 6 per cent. (less tax at 4s. 6d.) and 5 per cent. (tax free up to 6s. in the £) cumulative preference shares.

**The Brompton and Kensington Electricity Supply Co., Ltd.,** has declared an interim dividend of 10d. per share, less tax, on the ordinary shares (same).

**The Chelsea Electricity Supply Co., Ltd.,** has announced an interim dividend of 10d. per share on the ordinary shares, less tax (same).

**The Smithfield Markets Electric Supply Co., Ltd.,** has declared an interim dividend of 3 per cent., less tax, on the ordinary shares (same).

**The County of London Electric Supply Co., Ltd.,** has announced an interim dividend of 3 per cent., less tax, on the ordinary shares (same).

**The Electrical Finance and Securities Co.** has declared an interim dividend on the ordinary shares of 5 per cent., less tax (same).

**The Metropolitan Electric Supply Co., Ltd.,** has announced an interim dividend at the rate of 6 per cent. per annum in respect of the half-year's trading to June 30th last (same).

**The South London Electric Supply Corporation, Ltd.,** has declared an interim dividend of 3 per cent., less tax, on the ordinary shares.

**The London Electric Supply Corporation, Ltd.,** has announced an interim dividend of 4 per cent. actual (same).

**The Torquay Tramways Co., Ltd.,** has declared an interim dividend of 4 per cent., tax free, on the ordinary shares (same).

**The Yorkshire Electric Power Co.,** has declared an interim dividend of 3 per cent., less tax, on the ordinary shares (same).

# Stocks and Shares

TUESDAY EVENING.

WITH the politicians seated so firmly in the saddle as they are at the present time, it is not surprising to find Stock Exchange markets the reverse from active. It is equally easy to understand the reluctance on the part of the public to invest money, or to speculate with it in stocks and shares at a time when prices are liable to be upset by some unexpected twist of the wheel of international fortune, the hub of which is formed by the problems of Germany, surrounded closely by the suspicions of France. In the circumstances it must be admitted that Stock Exchange prices are holding their ground with a steadiness that suggests the public mind is convinced that a peaceful settlement will be reached. Were it not for some such impressions, prices would certainly be very much lower than they stand to-day.

## Electricity Supply Shares

This is not, however, the case with Electricity Supply descriptions; a somewhat superfluous statement, perhaps, having regard to the constancy of the market-strength displayed during the whole period of depression through which stock markets and industry have been ploughing their way for months past. Amongst the shares of the home electricity companies, Westminster ordinary have strengthened to 30s., and the tendency of the London shares is to approach this level. Charing Cross ordinary are already a few pence above 1¼. County of London ordinary, at 46s. 3d., have gone back 9d. In the provincial group, Northamptons advanced to £2, Richmond (Surrey) are 2 1/16, and Newcastle & District 23s.

The London Electric, Chelsea, and Brompton companies are amongst those which have announced, within the past few days, interim dividends at the same rates as those of a year ago

Atlas ordinary stand at 18s.; the preference, at 24s. 9d., hold their previous prices. British Power & Light shares show no change, at 9s.

## Home Railways

The Metropolitan Railway is expected to announce its interim dividend for 1931 on the Thursday in this week. A year ago the dividend was 1¼ per cent. actual; Stock Exchange anticipation looks for 1 or 1¼ per cent. this time. For the whole year, 1930, the Metropolitan dividend was made up to 3¼ per cent. actual, so that at the present price of 66½ the stock

yields nearly 7½ per cent. on the money. The fall of 3 points in the week is due to some little uncertainty felt in regard to the dividend announcement; but the doubts will have been dissolved before these lines are read.

The big railway companies are said to be definitely in favour of a wholesale electrification on the lines mapped out by the Weir Committee's report. The Minister of Transport has received suggestions from the principal companies, and it is expected that a conference will be called in the early future, the result of which meeting would be, no doubt, submitted to the Cabinet. The principal difficulty in the way of securing practical adherence to the Weir proposals lies in that of obtaining sufficient capital at reasonable rates, but if the Government were to guarantee a substantial slice of the outlay, the project could be put into operation very quickly. As to its advisability, that is a matter which is for the Government and the experts to decide.

Underground ordinary shares are 6d. lower at 20s. 6d. Central London assented ordinary, at 77, is up a point. At last week's meeting of the District Railway first preference stockholders, the proprietors agreed to the terms of exchange of District Railway stock for the stock of the new London Transport Board.

Experiments recently made with the idea of introducing telephones upon express and other trains have now been carried to the point at which it is claimed that passengers in trains travelling at a speed of anything up to 80 miles an hour can be put into communication, by telephone, with subscribers in any part.

## Cables and Wireless

Rises in Cables & Wireless stocks are due to bear covering more than to demand from the genuine investor. The preference has rallied 3 points to 53½. When the bears tried to take in their stock on Tuesday in this week, they found so marked a shortage that some of them were compelled to repurchase. Hence the recovery in the price. By sympathy the "A" ordinary strengthened to 15 and the "B" to 9½. In the face of these improvements, it looked anomalous to see Globe ordinary put down 10s. to 7s. The uncertainty of the dividend prospect is responsible for this. Some of the financial advisers are advocating the purchase of Globe 6 per cent. preference. Shares have come to market at 9½, or thereabouts, the yield on the money being 6½ per cent. Marconi Marines have receded to 32s. 6d. Great Northern Telegraphs are £1 down at 26. Erratic movements have left American Telephone & Telegraph 3 up at 183; International Telephone and Telegraph gained 1½, rising to 33. The newly-introduced Telephone & General Trust preference shares are quoted at 3d. premium over the issue price of a guinea at which these £1 shares were offered. Underwriters had to take about 72,000 of the 240,000 offered for public subscription. The Marconi Wireless Company has declared a dividend of 10 per cent., against 15 per cent. this time last year. All but a very small proportion of the Marconi shares are now included in the Cables & Wireless merger. Venezuela Telephone ordinary and "A" ordinary are dull, at 21s., upon the issue of a report showing a substantial diminution in earnings. The dividends on both classes of shares are maintained at their previous rate of 8 per cent. The company, as already announced, is about to be reorganised.

## Dollar Stocks

Mexican Light & Power common shares show a drop of 8½ points, at 38, there having been a mild pressure to sell stock upon a market none to eager for it. Other Mexican utilities are unaltered. The Latin-Canadian issues had been tolerably firm until the early part of this week, when Shawinigans drooped to 43¼, Montreal Light & Power to 46, and Power Corporation of Canada to 46. A drop of 18½ points lowered Toronto Suburban Railways first mortgage debenture to 30. Brazilian Tractions have been active round about 21½, which is a little better on the week. The Rio de Janeiro Tramways bonds are inclined to droop. Amongst South American sterling stock, Anglo-Argentine Tramways 5 per cent. debenture is 5 down, to 22½. This price is equal to the yield per cent. that the stock will return to a purchaser, provided the interest is met. Hitherto, this has always been the case. Buenos Aires Lacroze 5 per cent. extension debentures are 15 points down at 55: the last officially recorded bargains in the bonds were at 79 and 78¾, eight days ago. The 5 per cent. consolidated mortgage debentures, which were marked at 62½ on July 3rd, are now quoted 40 to 50.

## Manufacturing and Equipment

Siemens ordinary, after having fallen 3s. 3d. to £1 for no special reason that can be ascertained, partially rallied to 21s. 3d. The possibility of equipment companies securing big contracts if the Weir Committee's scheme for railway electrification is adopted, has had no effect upon prices of the companies' shares. Callender's are down ½ at 55s., and British Insulated have weakened to 28s. 9d. Henley's remain dull at 5½. G.E.C. ordinary are a firmer market. Associated Electrical Industries came into demand at 20s. India Rubber, Gutta Percha 5 per cent. debenture weakened to 88½ on the company's decision to close down the factory at Burton. The ordinary shares have changed hands recently at 3s. 9d.: the preference stand at 8s. 9d. The iron and steel division hangs fire. Babcock and Wilcox lost a florin, going back to 45s. 6d. Vickers, quoted at 6s. 9d., are attracting but little attention. The position of the rubber market is as inelastic as usual.

# Share List of Electrical Companies

### HOME ELECTRICITY COMPANIES

| | Nom. £ | Approx. Dividend 1929. | 1930. | Price July 21 1931. | Rise or fall. | Yield p.c. |
|---|---|---|---|---|---|---|
| Bournemouth and Poole ... ... | 1 | 15 | 15 | 3 | — | 5 0 |
| Brompton Ordinary ... ... ... | 1 | 8½ | 8½ | 28/6 | — | 4 18 3 |
| Central Electricity 4½% Deb. ... | Stock | — | 4½ | 96½ | — | 4 11 6 |
| Charing Cross Ordinary ... ... | 1 | 8½ | 8½ | 30/6 | — | 4 11 10 |
| Chelsea ... ... ... ... ... | 1 | 8½ | 8½ | 28/- | — | 5 0 0 |
| City of London ... ... ... | 1 | 10 | 10 | 37/- | — | 5 8 1 |
| Clyde Valley ... ... ... ... | 1 | 8 | 8 | 33/9 | — | 4 14 10 |
| County of London ... ... ... | 1 | 7 | 10 | 46/3 | —9d. | 4 6 6 |
| Edmundsons' 7% Pref. ... ... | 1 | 7 | 7 | 26/- | — | 5 7 8 |
| Elec. Supply Corporation ... ... | 1 | 11 | 12½ | 45/- | — | 4 17 9 |
| Kensington Ordinary ... ... | 1 | 8 | 8 | 29/6 | — | 5 8 6 |
| Lancs. Light and Power ... ... | 1 | 7 | 6½ | 22/6 | — | 5 15 7 |
| London & Home Counties 4½% Deb. | Stock | — | — | 98 | — | 4 12 0 |
| London Electric ... ... ... | 1 | 8½ | 9 | 34/- | — | 5 5 11 |
| Metropolitan ... ... ... ... | 1 | 9 | 10 | 2ST | — | 4 18 9 |
| Midland Counties ... ... ... | 1 | 6½ | 7 | 27/6 | — | 5 1 10 |
| Mid. Elec. Power ... ... ... | 1 | 15 | 8 | 28/3 | — | 5 13 3 |
| Newcastle-on-Tyne Ordinary ... | 1 | 6 | 6 | 22/6 | — | 5 6 8 |
| do. 7% Pref. ... ... | 1 | 7 | 7 | 27/6 | — | 5 1 10 |
| Notting Hill 6% Pref. ... ... | 10 | 6 | 6 | 11½ | — | 5 6 8 |
| North Met. Elec. 6% Pref.... ... | 1 | 6 | 6 | 24/- | — | 5 0 0 |
| St. James' and Pall Mall ... ... | 1 | 8 | 8 | 30/- | — | 4 13 4 |
| Scottish Power ... ... ... | 1 | 8 | 8 | 28/9 | — | 5 11 5 |
| South London ... ... ... ... | 1 | 8½ | 8½ | 27/6 | — | 5 1 10 |
| Urban Ordinary ... ... ... | 1 | 7 | 7 | 28/3 | — | 4 19 1 |
| Westminster Ordinary ... ... | 1 | 9½ | 8½ | 30/- | +6d. | 4 13 4 |
| Whitehall Elec. Invst. 7½% Pref.... | 1 | 7½ | 7½ | 25/9 | +3d. | 5 16 6 |
| Yorkshire Elec. ... ... ... | 1 | 8 | 8 | 31/3 | — | 5 2 5 |

### HOME RAILS

| | | | | | | |
|---|---|---|---|---|---|---|
| Central London Ord. Assented ... | Stock | 4 | 4 | 77 | +1 | 5 3 6 |
| Metropolitan ... ... ... ... | ,, | 4 | 3½ | 45½ | —3 | 7 13 6 |
| do. District ... ... | ,, | 5 | 5 | 64½ | — | 7 15 0 |
| Underground Electric ... ... | £1 | 8 | 8 | 20/6 | — | 7 16 |

### TELEGRAPHS AND TELEPHONES

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Am. Tel. Pref.... ... ... | Stock | 6 | 6 | 104½ | — | 5 14 10 |
| do. Def- ... ... ... | ,, | 1½ | 1½ | 25 | — | 6 0 0 |
| Automatic Telephone ... ... | 1 | 12½ | 12½ | 32/6 | — | 7 13 10 |
| Cables & Wireless 5½% Pref. ... | Stock | 5½ | 5½ | 53½ | +3 | 10 4 8 |
| do. A 7½% Ord. ... ... | ,, | Nil | — | 15 | +1 | ... ... |
| do. B Ord. ... ... | ,, | Nil | — | 9½ | +½ | ... ... |
| Globe Tel. and T. Ord. ... ... | 10 | 10 | 8½ | 7 | —½ | *12 2 10 |
| do. do. Pref. ... ... | 10 | 6 | 6 | 9 | —½ | 6 13 4 |
| Great Northern Tel. ... ... | 10 | 20 | 20 | 26 | —1 | 7 13 10 |
| Marconi-Marine ... ... ... | 1 | 15 | 15 | 32/6 | —9d. | 9 4 8 |
| Oriental Telephone Ord. ... ... | 1 | 12 | 12 | 2½ | — | *5 6 6 |

### HOME AND FOREIGN TRAMS, &c.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. ... | 5 | 5½ | — | 12/6 | — | ... ... |
| do. do. 2nd Pref. ... | 5 | 6 | — | 7/6 | — | ... ... |
| do. do. 5% Deb. ... | Stock | 5 | 5 | 22½ | —5 | 22 8 0 |
| British Electric Traction Def. Ord. | ,, | 5 | 5 | 950 | —25 | ... ... |
| do. do. Pref. Ord. ... | ,, | 8 | 8 | 124½ | — | 6 8 9 |
| Brazil Traction ... ... ... | 100 | 8 | — | 21½ | — | ... ... |
| Brit. Columbia Elec. Rly. Pce. ... | Stock | 5 | 5 | 96½ | — | 5 3 3 |
| London & Sub. Trac. 5% Pref. ... | 1 | Nil | Nil | 12/- | — | ... ... |
| London United Tram Deb. ... | Stock | 4 | 4 | 63½ | — | 6 7 0 |
| Mexico Trams, 5% Bonds ... ... | — | 5 | 5 | 42½ | — | 11 15 4 |
| Mexican Light Common ... ... | 100 | Nil | Nil | 38 | —8½ | ... ... |
| do. 7% Pref. ... ... ... | 100 | 7 | 7 | 71½ | — | 9 15 10 |
| do. 1st Bonds ... ... ... | — | 5 | 5 | 75½ | — | 6 12 5 |
| Victoria Falls Ord. ... ... ... | 1 | 15 | 15 | 58/9 | — | 5 2 2 |
| Yorkshire (West Riding) ... ... | | Nil | Nil | 6/3 | — | ... ... |

### MANUFACTURING COMPANIES

| | | | | | | |
|---|---|---|---|---|---|---|
| Assoc. Elec. Ord. ... ... ... | 1 | 6 | 6 | 20/- | — | 6 0 0 |
| do. Pref. ... ... ... | 1 | 8 | 8 | 28/3 | +3d. | 5 12 3 |
| Babcock & Wilcox ... ... ... | 1 | 15 | 14 | 45/6 | —2/- | *6 8 1 |
| British Aluminium Ord. ... ... | 1 | 10 | 10 | 28/9 | —9d. | 6 19 2 |
| British Insulated Ord. ... ... | 1 | 15 | 15 | 2½ | — | 5 9 1 |
| Brush Ord. ... ... ... ... | Stock | 10 | 5 | 60 | — | 8 5 0 |
| Callenders ... ... ... ... | 1 | 15 | 15 | 2½ | —¼ | 5 9 1 |
| do. 6½% Pref.... ... ... | 1 | 6½ | 6½ | 26/3 | — | 4 19 1 |
| Crompton Parkinson Ord. ... ... | 5/- | 30 | 30 | 8 | — | 8 11 5 |
| do. 8% Pref. ... ... ... | 1 | 8 | 8 | 28/3 | — | 5 13 3 |
| Edison-Swan 1st Pref. ... ... | 1 | 7½ | 7½ | 23/9 | — | 6 6 4 |
| do. 5% Deb. ... ... | Stock | 5 | 5 | 92½ | — | 5 8 1 |
| Electric Construction ... ... | 1 | 5 | Nil | 11/3 | — | ... ... |
| Enfield Cable Ord. ... ... | 1 | 25 | 25 | 4 | — | 6 5 0 |
| English Electric ... ... ... | 1 | Nil | Nil | 5/- | — | ... ... |
| do. do. Pref. ... ... | 1 | Nil | Nil | 5/- | — | ... ... |
| Ferranti Pref. ... ... ... ... | 1 | 7 | 7 | 20/6 | — | 6 16 7 |
| G.E.C. Pref. ... ... ... ... | 1 | 6½ | 6½ | 25/6 | — | 5 2 0 |
| do. Ord. ... ... ... | 1 | 14 | 10 | 2 | — | 5 0 0 |
| Henley ... ... ... ... ... | 1 | 30 | 30 | 5½ | — | 5 9 1 |
| do. 4½% Pref. ... ... ... | 5 | 4½ | 4½ | 43 | — | 5 2 10 |
| India-Rubber ... ... ... ... | 1 | Nil | Nil | 4/6 | — | ... ... |
| Johnson & Phillips ... ... ... | 1 | 10 | 10 | 28/9 | — | 6 19 2 |
| Siemens Ord. ... ... ... ... | 1 | 7½ | 7½ | 21/3 | —2/- | 7 1 2 |
| Telegraph Construction ... ... | 12 | 10 | 7½ | 11 | —½ | 8 2 0 |

*Dividends paid free of INCOME TAX.

# Canadian Imports and Exports

## The United States still the Predominant Supplier

THE following figures, showing the imports into and exports from Canada of electrical and similar materials during the year ended March 31st, 1931, are taken from the recently-issued trade statistics. Figures for the year 1929-30 are given for purposes of comparison, and notes of any increases or decreases have been added:—

### Imports

| | 1929-30. Thou. $ | 1930-31. Thou. $ | Inc. or dec. Thou. $ |
|---|---|---|---|
| *Copper wire, covered, including cable—* | | | |
| Total | 779 | 433 | − 346 |
| From United Kingdom | 178 | 25 | − 153 |
| ,, United States | 595 | 406 | − 189 |
| *Electric batteries, primary—* | | | |
| Total (mainly from United States) | 121 | 143 | + 22 |
| *Electric batteries, storage—* | | | |
| Total | 610 | 616 | + 6 |
| From United Kingdom | 313 | 359 | + 46 |
| ,, United States | 296 | 255 | − 41 |
| *Electric fans—* | | | |
| Total (mainly from United States) | 222 | 186 | − 36 |
| *Electric fuses, fuse plugs, and cut-outs—* | | | |
| Total (mainly from United States) | 275 | 185 | − 90 |
| *Lightning arrestors, choke coils, &c.—* | | | |
| Total (mainly from United States) | 130 | 120 | − 10 |
| *Rheostats, controllers, &c.—* | | | |
| Total | 858 | 544 | − 314 |
| From United Kingdom | 72 | 70 | − 2 |
| ,, United States | 769 | 463 | − 306 |
| *Sockets, outlets, and receptacles—* | | | |
| Total (mainly from United States) | 359 | 266 | − 93 |
| *Sparking plugs, magnetos and other ignition apparatus—* | | | |
| Total | 1,175 | 458 | − 717 |
| From United States | 1,148 | 443 | − 705 |
| ,, United Kingdom | 14 | 5 | − 9 |
| *Electric cooking and heating apparatus—* | | | |
| Total | 525 | 453 | − 72 |
| From United Kingdom | 6 | 1 | − 5 |
| ,, United States | 516 | 450 | − 66 |
| *Dynamos and generators—* | | | |
| Total | 2,487 | 1,263 | − 1,224 |
| From United Kingdom | 534 | 337 | − 197 |
| ,, United States | 1,805 | 682 | − 1,123 |
| ,, Sweden | 113 | 244 | + 131 |
| *Electric lighting fixtures—* | | | |
| Total | 1,182 | 1,012 | − 170 |
| From United Kingdom | 37 | 22 | − 15 |
| ,, United States | 1,085 | 950 | − 135 |
| *Electric meters—* | | | |
| Total | 393 | 355 | − 38 |
| From United Kingdom | 55 | 89 | + 34 |
| ,, United States | 335 | 262 | − 73 |
| *Arc lamps—* | | | |
| Total (mainly from United States) | 48 | 48 | — |
| *Incandescent lamps—* | | | |
| Total | 240 | 125 | − 115 |
| From United Kingdom | 3 | 5 | + 2 |
| ,, United States | 151 | 50 | − 101 |
| ,, Austria | * | 32 | — |
| ,, Japan | 15 | 37 | + 22 |
| *Self-contained lighting sets—* | | | |
| Total | 76 | 39 | − 37 |
| From United Kingdom | 4 | 1 | − 3 |
| ,, United States | 72 | 38 | − 34 |
| *Electric motors—* | | | |
| Total | 4,649 | 2,719 | − 1,930 |
| From United Kingdom | 620 | 567 | − 53 |
| ,, United States | 3,889 | 2,103 | − 1,786 |
| ,, Sweden | 85 | 15 | − 70 |
| *Switches, switchboards, circuit breakers, and parts—* | | | |
| Total | 2,784 | 1,439 | − 1,345 |
| From United Kingdom | 328 | 155 | − 173 |
| ,, United States | 2,449 | 1,225 | − 1,224 |
| ,, Switzerland | 5 | 13 | + 8 |
| *Telephone instruments—* | | | |
| Total | 3,020 | 2,545 | − 475 |
| From United Kingdom | 229 | 420 | + 191 |
| ,, United States | 2,794 | 2,124 | − 670 |
| *Transformers—* | | | |
| Total | 817 | 780 | − 37 |
| ,, United Kingdom | 111 | 386 | + 275 |
| ,, United States | 648 | 390 | − 258 |
| *Radio valves—* | | | |
| Total | 580 | 237 | − 343 |
| From United Kingdom | 29 | 21 | − 8 |
| ,, United States | 551 | 216 | − 335 |
| *Radio apparatus, n.o.e.—* | | | |
| Total | 9,976 | 7,845 | − 2,131 |
| From United Kingdom | 74 | 66 | − 8 |
| ,, United States | 9,869 | 7,737 | − 2,132 |
| *Telegraph instruments—* | | | |
| Total | 587 | 382 | − 205 |
| From United Kingdom | 111 | 60 | − 51 |
| ,, United States | 382 | 322 | − 60 |
| *Electrical apparatus, n.o.e.—* | | | |
| Total | 6,489 | 4,577 | − 1,912 |
| From United Kingdom | 175 | 198 | + 23 |
| ,, United States | 6,181 | 4,308 | − 1,873 |
| *Total electrical apparatus†* | 37,611 | 26,805 | −10,806 |
| From United Kingdom | 2,727 | 2,769 | + 42 |
| ,, United States | 34,177 | 23,413 | −10,764 |
| *Electric vacuum cleaners—* | | | |
| Total (mainly from United States | 270 | 780 | + 510 |

### Exports

| | 1929-30. Thou. $ | 1930-31. Thou. $ | Inc. or dec. Thou. $ |
|---|---|---|---|
| *Batteries—* | | | |
| Total | * | 298 | — |
| To South Africa | * | 15 | — |
| ,, New Zealand | * | 197 | — |
| ,, Holland | * | 24 | — |
| *Telegraph, telephone and radio apparatus—* | | | |
| Total | * | 204 | — |
| To United States | * | 43 | — |
| ,, Newfoundland | * | 24 | — |
| ,, New Zealand | * | 73 | — |
| ,, Brazil | * | 36 | — |

[Last year's total exports of the foregoing items, which were not then shown separately, amounted in value to $762,000.]

| | | | |
|---|---|---|---|
| *Dynamos, generators, and motors—* | | | |
| Total | 41 | 59 | + 18 |
| To United Kingdom | 7 | — | − 7 |
| ,, United States | 18 | 15 | − 3 |
| *Electric cooking and heating devices—* | | | |
| Total | 766 | 726 | − 40 |
| To United Kingdom | 14 | 7 | − 7 |
| ,, New Zealand | 320 | 212 | − 108 |
| ,, Australia | 172 | * | — |
| ,, Irish Free State | 8 | 74 | + 66 |
| *Sparking plugs, magnetos, &c.—* | | | |
| Total | 460 | 297 | − 163 |
| To United Kingdom | 157 | 164 | + 7 |
| ,, Australia | 118 | 11 | − 107 |
| ,, India | 48 | 30 | − 18 |
| ,, Japan | 19 | 16 | − 3 |
| ,, New Zealand | 48 | 23 | − 25 |
| *Electrical apparatus, n.o.e.—* | | | |
| Total | 493 | 425 | − 68 |
| To United Kingdom | 64 | 49 | − 15 |
| ,, United States | 40 | 31 | − 9 |
| ,, Australia | 11 | 11 | — |
| ,, Japan | 44 | 36 | − 8 |
| ,, Mexico | 89 | 128 | + 39 |
| ,, Newfoundland | 36 | 44 | + 8 |
| ,, New Zealand | 108 | 88 | − 20 |
| *Total electrical apparatus†* | 2,521 | 2,009 | − 512 |
| To United Kingdom | 274 | 230 | − 44 |
| ,, United States | 107 | 97 | − 10 |
| *Electric vacuum cleaners—* | | | |
| Total | 2,067 | 2,099 | + 32 |
| To United Kingdom | 1,427 | 1,707 | + 280 |
| ,, Germany | 294 | 196 | − 98 |
| ,, New Zealand | 127 | 39 | − 88 |
| ,, Australia | 87 | 39 | − 48 |
| ,, Holland | 115 | 82 | − 33 |

* Not specified. † Not including vacuum cleaners.

### The Turkish Electrical Market

Exclusively relying on imports, Turkey offers an excellent opening for lamps owing to the progressive electrification of the towns in Anatolia, it is stated in a French official report. It was not until 1910 that electricity supply stations commenced to be installed in the country, but, nevertheless, at the end of 1929 there were 31 separate districts served in this way, and of these 31 stations, 18 were constructed during 1929. Taking into consideration the stations projected and those now under construction, it is obvious that there will be a large and increasing demand for electrical material and supplies.

# German Power Production Declines in 1930

A DECLINE of 1,500 million kWh to 29,100 kWh was reported by the German electricity supply industry for 1930. The United States Commercial Attaché in Berlin says that up to the end of 1929 the industry was comparatively little affected by economic conditions. This was chiefly due to the fact that the reconstruction and rationalisation of German commerce and trade brought about an extensive electrification of plants and an increased consumption of electricity. The capacity of 103 electricity works covered by the official monthly statistics amounted to 4,600,000 kW at the beginning of 1930 as against 3,100,000 kW at the beginning of 1925. The advance was almost uninterrupted and continued during the critical year 1926 as the reconstruction and rationalisation of the plants was in full swing at that time. A decline in the consumption capacity did not set in until 1930 when the commercial situation became precarious. This decline was largely due to the shutting down of plants.

### Increase in Domestic Consumption

Commercial undertakings still consume at least three-quarters of the electrical energy, but the use of electrical household appliances has increased to a great extent in recent years. The apartments that were erected in the period from 1925 to 1929 numbered approximately 1,300,000, and practically all of them were provided with electrical installations. A considerable number of old apartments were also electrified. According to an investigation conducted by the Berlin Electricity Works, the number of wired households in Berlin increased from 27 to over 54 per cent. in this period.

### The Falling-off since 1927

Following the business peak in 1927, the production of energy became slower year by year. The increase over the previous year, which in 1927 still amounted to 18 per cent., dropped to nearly 11 per cent. in 1928 and to 10 per cent. in 1929. The effects of the commercial decline on this production were first noticeable in the shrinking of the electrical requirements of industry and resulted in a decrease in the output of private producers. The public works did not feel the decline badly until somewhat later, as they supply a large part of their current to other than commercial users. The fall in private production was also partly due to the fact that in recent years quite a large number of these producers have closed down and cover their requirements from the public works. It is to be expected that the "non-commercial" consumption, especially in the domestic sphere, will increase considerably in the future, especially as Germany is behind some other countries in this respect. It is estimated that the average consumption per household in Germany is less than 200 kWh per annum; this is considered to indicate a large scope for expansion.

# Wiring Regulations for Domestic Appliances in New Zealand

THE British Trade Commissioner at Wellington has forwarded to the Department of Overseas Trade an extract from a letter from the Chief Electrical Engineer, Public Works Department, Wellington, dated May 20th, 1931. In this it is stated that under Regulation No. 99 of the New Zealand Wiring Regulations, which were gazetted in July, 1927, it is laid down that in all cables, including flexible cords, red shall distinguish the live conductor, and black the neutral or common return. This applies throughout the installation to the current-consuming device. Regulation 85 of the Wiring Rules of the Institution of Electrical Engineers also specifies under "Identification of Cables by Colour" that "red" shall distinguish the switch or live wire up to the lamp or other consuming device when the switch is closed.

The attention of the Public Works Department has been called to the fact that British electrical appliances being received in New Zealand and wired up by the manufacturers, have the red wire in three-core flexible cords connected to the earthing terminal on the device.

Some appliances are received in New Zealand without a plug attached to the supply end of the flexible cord and when the wiring up of the plug is done by New Zealand wiremen working under New Zealand Wiring Rules, the "red" wire is normally attached to the phase or live terminal of the plug. The result is that the frame of the appliance is made alive, with consequent risk of serious shock being received by the user before the error is discovered.

The Chief Electrical Engineer desires the matter to be brought to the notice of British manufacturers of portable electrical appliances to which the flexible cords are attached in England before despatch to New Zealand.

So far the only articles which have come under notice as being incorrectly wired are electric irons, radiators and kettles wired with three-core flexible cord. The red and black requirement in flexible cords should be impressed on British manufacturers supplying the New Zealand market. No definite colour has been chosen to distinguish the earthing wire in three-core flexible cords. This is left to the discretion of the manufacturer, but the red and black are defizitely identifiable in New Zealand as the live wire and neutral respectively.

# Prospects in Czecho-Slovakia

IN a recent D.O.T. report on economic conditions in Czecho-Slovakia by Mr. H. Kershaw, Commercial Secretary at the British Legation, Prague (Stationery Office, 1s. 6d. net) it is shown that the electrical trade between that country and Great Britain runs in favour of the former. The provisional figures for 1930 give the value of electrical machinery and apparatus imported from Great Britain as 8,727,000 kr. (£53,000); at the same time Czecho-Slavakia exported goods of this class to the value of 19,983,000 kr. (£122,000) to this country. It is stated that British goods enjoy an excellent reputation in the Republic, and, with a gradual industrial revival, and an increasing desire for articles of medium and superior quality, they are certain to come more and more into favour. Careful inquiries, carried out over a considerable area and among different interests, have elicited the opinion that, with zeal and initiative, British trade might be developed or increased in a number of lines, among them being electrical conductors, apparatus and other electro-technical materials and radio sets.

In another part of the report it is stated that plans for the complete electrification of the various communal districts are proceeding fairly rapidly. There are now 8,355 communal districts provided with electricity, whilst 7,068 districts are still without. Of these latter 2,278 are in Bohemia, 1,305 in Moravia, 3,037 in Slovakia and 448 in Ruthenia. In addition to the electrification of the various districts, progress is also being made by industrial concerns in the installation of electric generating stations to supply energy for all purposes. The total amount of electrical energy generated for all purposes throughout Czecho-Slovakia in 1928 was 2,748,537,000 kWh.

The law providing for reduced rates of duty for machinery of certain types which are not made in Czecho-Slovakia is to remain in force for a further period of three years.

# British Empire Boiler Standardisation Work

THE recommendation of the Imperial Conference regarding the co-ordination of all codes and standard specifications issued within the British Empire is having a most beneficial effect, particularly in connection with Australian and British Standards in engineering. A notable example is the Australian Boiler Code recently issued, which is under review by the Standards Association of Australia, and has been forwarded to the Home Committee for comment with a view to ultimate co-ordination as far as practicable.

The British Engineering Standards Association, as the result of a fully representative conference of boiler makers and users, insurance companies, &c., has nominated a strong executive committee, under the chairmanship of Rear-Admiral Sir Robert Dixon, K.C.B., to prepare a set of British Standard Boiler Rules and Specifications. Further, the boiler makers of the country have formed a permanent makers' panel, under the chairmanship of Lt.-Colonel E. Kitson Clark, president, Institution of Mechanical Engineers, and have nominated some twelve of their number on to the above Executive Committee to represent the whole of the boiler makers' interests of the country. The Executive Committee will be at liberty, through this makers' panel, to consult all the manufacturing interests in order to bring to the Executive Committee the consensus of opinion of the producing interests on any point at issue. The Committee is also assured of the fullest support of the engineering insurance companies, and it is probable that, at their own request, they will be entrusted with the preliminary work of co-ordinating certain portions of the proposed rules. The boiler makers have already broadly considered the question as to the best method of dividing up the work. The Australian Committee has already signified its desire for cordial co-operation in the work, and the hope is that ultimately rules governing the design and construction, &c. of boilers, will be arrived at applicable to the whole of the British Empire.

The Mechanical Industry Committee of the Association has also received a unanimous recommendation from a fully representative conference of pump users and makers, and has authorised the constitution of a Pump Test Committee, under the chairmanship of Mr. Richard Allen, C.B.E., to co-operate with a similar committee in Australia which has recently issued a draft Australian Pump Test Code. In this case also there is a general desire to adopt the Australian draft as a basis and to alter it as little as possible.

# Parliamentary Notes

[By Our Special Parliamentary Reporter.]

### "Pylons" on the Yorkshire Moors

On July 13th, MR. LATHAM asked the Minister of Transport what was the cost of the electricity pylons between Malton and Whitby under the schemes submitted for his consent by the Electricity Commissioners.

MR. MORRISON said he understood from the Central Electricity Board that the estimated cost of the pylons and foundations for this line was £22,800.

MR. LATHAM further asked the Minister whether he had yet received an application from the Electricity Commissioners for his consent to schemes embodying a proposal to set up electricity pylons on the Yorkshire moors between Pickering and Whitby; and whether he would withhold his consent from any scheme that would disfigure the beauty of the moorland scenery.

MR. MORRISON said he had received an application from the Central Electricity Board for consent to the erection of a portion of the overhead line which would ultimately connect Pickering with Whitby. None of the various local authorities through whose area the line would pass had expressed a desire to be heard against the application. In connection with the same overhead line he had received an application for certain compulsory wayleaves which would receive consideration in accordance with the powers conferred on him by the Electricity (Supply) Acts.

On July 15th, MR. TURTON asked the Minister whether he had considered the terms of the resolution passed and sent to him by the North Riding County Council on June 3rd protesting against the proposed erection of these pylons; and whether he would, before giving his consent to the scheme, give the County Council an opportunity of being heard under Section 21 of the Electricity Act, 1919.

MR. MORRISON said he had considered the terms of the resolution passed by the County Council. While that body had urged that an alternative route should be used, if possible, for the overhead line, it had not exercised its right of claiming an opportunity to be heard.

MR. TURTON asked if the Minister would hold a local inquiry now, in view of the grave dissatisfaction in the district with the proposal.

MR. MORRISON said that the procedure was laid down in the Act, and the local authorities had not yet taken advantage of that procedure. He had not yet come to a decision, and he would consider the communications which had been forwarded to him, but people could not have inquiries if they did not ask for them in the proper way.

### Effects of the North-East England Scheme

On July 15th, MR. TURTON asked the Minister of Transport if he would state what was the load estimated to be carried on the secondary main transmission line between Malton and Whitby under the scheme submitted for his approval; and how many existing generating stations would be discontinued as a result of the scheme.

MR. MORRISON said he understood that the current-carrying capacity of the secondary main transmission line was 25,000 kW. There were 15 public generating stations in the area of the North-East England Electricity Scheme, of which six were selected stations. The Scheme also contemplated that five of the other public stations would be used for the time being under temporary arrangements between the owners and the Central Electricity Board.

On July 15th, MR. LATHAM asked the Minister of Transport whether the £22,800 Whitby-Malton pylon electricity scheme would supply Pickering, Grosmont, Goathland, and Glaisdale; and, if not, from what place was it proposed to supply these townships.

MR. MORRISON said that the places referred to were within the area of supply of the Cleveland and Durham County Electric Power Company, and supplies under the North-East England Scheme would be afforded to the company by the Central Board at grid points at Malton and Northallerton.

### Preserving the Moorland Amenities

MR. LATHAM asked whether all that would not involve further expenditure and more disputes, and give to that beautiful country an aspect of an industrial area.

MR. MORRISON said that the purpose of all this was greater economy in the generation of electricity supply, and the action was taken under an Act passed by the last Conservative Government.

COL. ASHLEY asked whether the Minister would approach the Board so that they would place the pylons in the valleys and not on the hilltops.

MR. MORRISON said that certainly he would. He was always anxious that the transmission lines should be placed so that there was the least injury to amenity, and the Central Board was willing to co-operate to that end.

### The Use of British Materials

On July 15th, MR. WELLOCK asked the Minister of Transport whether, with respect to loans to electricity undertakings on special terms, it was a condition that British materials only should be used; and whether any steps were taken to see that excessive prices were not charged for such materials.

MR. MORRISON said that when financial assistance was given by the Government towards the carrying out of schemes by electricity or other undertakings it was a condition of such assistance that, so far as practicable, British materials only should be used. Exceptions to this rule might, however, be made with the permission of the appropriate Committee, and in giving or withholding such permission the Committee would have regard to the desirability of securing that excessive prices were not charged for such materials.

### L. & N.E.R. Electrification

On July 15th, MR. QUIBELL asked the Minister of Transport whether it was intended to proceed with the proposed alterations to Liverpool Street Station and the electrification of the railway serving the East End of London and the Eastern Counties; and would he inform the House what had become of the plans drawn up in connection with the scheme.

MR. MORRISON said he was informed by the London and North Eastern Railway Company that it was actively considering the question of such developments at Liverpool Street Station and in the former Great Eastern Railway area, and that in the event of the London Passenger Transport Bill becoming law it was anticipated that a scheme would be ready for submission to the Standing Joint Committee of the proposed Transport Board and the amalgamated railway companies, which would be set up under the Bill to consider such proposals affecting their joint interests. The company added that in the meantime the work of preparing the scheme was not being held up.

### The Factories Report

MR. CLYNES, Home Secretary, informed Major Evans on July 16th that the illness of the Chief Inspector of Factories had delayed the preparation of his annual report for 1930. The report had now been completed, and it was hoped that it would be submitted to Parliament before the adjournment.

### The Brighton Corporation Bill

This Bill contains provisions relating to the electricity undertaking, and during the proceedings before a Select Committee of the House of Commons last week, Mr. M. Fitzgerald, for the Corporation, said that it was proposed to include a clause to remedy an injustice with regard to income tax. They claimed that a Corporation should be treated on the same footing as a private individual who could set off a loss on one of his businesses against a profit on another. The Corporation proposed to pay the electricity profits into its general fund, but a similar amount would be paid out of that fund into the electricity accounts.

The Electricity Commissioners objected that such a procedure would make administration difficult; no other Corporation had the power for which Brighton asked.

MR. FITZGERALD said that the electricity consumers would be unaffected. Any loss that there was would be sustained by the Inland Revenue authorities who did not object to the proposal and who admitted that there was an injustice in the present procedure.

The Committee passed the clause in question.

# Legal

### Sign Companies' Dispute

In the King's Bench Division, on July 16th, Mr. Justice Avory and a common jury had before them an action by the Franco-British Electrical Co., Ltd., Oxford Street, W., against the Brilliant Sign Co., Ltd., Shepherd's Bush, W., claiming damages for libel.

SERJT. SULLIVAN, K.C., for the plaintiffs, said that the Commodore Theatre, Ltd., Hammersmith, needed a sign for their café and the plaintiffs and the defendants both tendered for an illuminated sign. The defendant company submitted sketches for a sign at a cost of £35 10s., or a cheaper sign at £16 10s. The plaintiffs also tendered for an illuminated sign of a more extensive character complete for £45 10s., with an alternative tender of £33. The plaintiffs' tender was accepted and the work was duly carried out. Later the defendants wrote to the Commodore Theatre stating that they had examined the sign erected and added "as a rough estimate we should have been only too pleased to supply and fix the sign you have now erected for under £5." Plaintiffs complained that this was a libel upon the reputation of the company.

Evidence was called in support of plaintiffs' case. It was stated that ultimately the theatre had another sign and sold the old one for £8.

MR. J. D. CASSELS, K.C., for the defendants, submitted that the letter in question was not reasonably capable of the defamatory meaning alleged, and that there was no evidence that the defendants knew that the sign in question was supplied by the plaintiffs for £33. No special damages were here claimed.

His Lordship said the question for the jury would be whether the words amounted to anything more than a disparagement of the plaintiffs' goods. If it amounted to nothing more than that it was not actionable. He held that the letter was written on a privileged occasion.

MR. CASSELS said the defendants pleaded privilege. His case was that at the time the letter was written they were not aware who were the makers of the sign and until the case started they were not aware of the price paid for it. With regard to the letter his clients had made a box sign with the word "café" on it, somewhat similar to plaintiffs' sign, for £4 3s. His submission was that there was here no libel but a mere disparagement of goods.

Defendants called evidence in support of their case.

His Lordship having summed up, the jury after long deliberation found a verdict for the defendants, but added that after the tender of the defendants was not accepted, their conduct was reprehensible.

Judgment was entered for the defendants with costs.

### Aylesbury Borough Council Sued

AT the Aylesbury County Court last week Judge Randolph, K.C., heard an action in which a local firm of drapers, Messrs. Marbeth & Co., Ltd., claimed from the Aylesbury Borough Council £3 6s. 9d., which they alleged had been overcharged for electricity.

MR. W. A. MARBETH, plaintiffs' managing director, said that in September last the Council advertised a 20 per cent. reduction in the cost of electricity. He then pointed out to the Council that actually the new system would mean an increase of 20 per cent. to shopkeepers. The Council gave an undertaking that he would not have to pay any more than under the old scale, but in spite of this they overcharged him on his next account. He deducted the excess amount and the Corporation then cut off the supply not only to the premises concerned, but also to other premises belonging to the company. Witness said that the Council offered electricity at 1d. per kWh for cooking, but, although he had a separate meter for the purpose, he was charged 1½d. per kWh; this was the basis of the claim.

MR. HENDERSON, for the Corporation, stated that the plaintiffs had not complied with the terms of the new scale until March last. The material part of that scale was that where a residence and business premises were combined, the lighting of both premises would be connected to the demand indicator of the business portion. He explained the methods of charging to show that the flat rate for heating and cooking was 1½d., while the rate for lighting was 8d., falling after a certain consumption to 4d. The tariff instituted on October 1st, 1930, provided for a cooking charge of 1d. per kWh for combined residence and business premises. He contended that this was a case of a limited company and its place of business, and not a residence. The consumer was a company; the action was a test case. HIS HONOUR commented that that was purely a technicality, but it might be a good one. A company might place a general manager and his family over the business premises and supply the light, the whole house belonging to the company. Mr. Henderson claimed that the premises were sub-let.

In cross-examination, Mr. Marbeth stated that he rented rooms from the company. His demand indicators had been installed in March last when the Council took away one meter and connected the lighting and cooking and heating services to the other. Later, he said, he had been charged the full lighting rate for energy which had been used for cooking and heating.

A witness called by the plaintiffs stated that he had combined residential and business premises and had been charged only 1d. per kWh for cooking.

His Honour reserved judgment.

# Correspondence

*Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession*

### Hire-purchase

The letter on hire-purchase signed "Interested" in your issue of July 10th raises important issues. As a preliminary let me call an important witness, who has come forward since the publication of my original letter in your issue of July 3rd, to support my contention that sufficient use is not being made by electrical contractors of the facilities which we offer.

The Macmillan Committee divides the types of transactions for which intermediate credit is required into three classes (i) hire-purchase or instalment sales, (ii) advances against deferred payment, and (iii) long-term contracts. The United Dominions Trust is, of course, primarily concerned with classes (i) and (ii). The Committee observes (paragraph 394): "In the case of all these classes we believe that adequate credit facilities for use internally in this country are available and are being developed, but that in the case of classes (i) and (ii) not so much use is made of them as is possible and desirable. Recent experience appears to show that, on proper lines and with sound supervision, the risk of loss in the granting of such credits is small, while on the other hand their value in stimulating home consumption should be great. The use of electrical and mechanical appliances by the great bulk of the population is capable of very great extension and would, we believe, be greatly facilitated by the more widespread application of instalment buying, the advantages of which much outweigh in our view any disadvantages which are alleged against it. It is, of course, essential that British traders should be made fully aware of the facilities which exist and that they in turn should be prepared to make use of them."

Your correspondent believes in hire-purchase and portrays certain difficulties which in his opinion are preventing the proper expansion of the business. Now if these difficulties were a real factor in the problem it might have been expected that they would be felt as equally hampering in every industry which deals on instalment terms. In less than twelve years, however, the United Dominions Trust has expanded its turnover from nil to over £5,000,000 per annum. The proportion of our financing which is done for the electrical industry is ludicrously small. I am confident that it will expand enormously, but my company will do nothing to secure an expansion at the expense of sound principles.

Your correspondent fails to grasp that United Dominions Trust (Electric), Ltd. (and the same applies to any other similar institution conducting its business on sound lines) is a bank, and that as a bank it offers credit not to the purchaser but to the seller. It enables the latter to extend credit to his customer and to obtain ready money for himself. It is therefore natural and essential that the bank should be satisfied as to the credit standing of the contractor.

When these facts are grasped they will also explain why the contractor is liable for any contingent loss. I hesitate to go further into this aspect of the matter since your correspondent admits that "sheaves of arguments" can be produced in favour of the principle but thinks that they "can get us nowhere." In the hope, however, of convincing other interested parties, I must offer one or two observations.

Firstly, for more or less technical reasons which I will not state at length, the system under which both the seller and the buyer are liable is the only one under which any company financing instalment selling can obtain the necessary funds to enable it to do so to an unlimited extent.

In the second place, a bank should confine itself to banking. We do not purport to be a credit insurance company. Still more important, we do not deal in merchandise. Any company financing instalment selling would have to set up an entirely separate organisation to deal with re-possessed articles of a multifarious character if it, instead of the seller, became the possessor of the merchandise in case of default. It would be brought into competition with its own client in the sale of second-hand articles. The seller, on the other hand, is already equipped to deal with re-possessed articles, and if the original agreement has been drawn up on proper lines the value of the article should at any period be worth more than the amount of the outstanding instalments.

In the third place, I may say from experience that no creditor ever suffered loss through undertaking a risk which we recommended. This is due to the fact that we are as careful in investigating the credit of the purchaser as we are in investigating the credit of the seller or contractor. The last thing which the bank specialising in instalment business desires or can afford is that its client, the seller, should lose by any transaction which the bank approves.

I could give several other reasons in favour of our system, but I should have to make an inordinate demand upon your space. I must, however, deal with the point raised as to the terms offered by manufacturers and supply authorities. The main interest of the manufacturer and the supply authority respectively is to sell equipment and current. They can, therefore, afford to make no profit at all (or even, in some cases, owing to the saving of trade discount, incur an actual loss) on the provision of hire-purchase facilities. The United Dominions Trust (Electric), not being a philanthropic institution, cannot do so, but we shall not get that expansion of business which the Macmillan Committee thinks can be obtained by the extension of intermediate credit if it is accorded mainly by those whose primary interest is selling merchandise, and if full advantage is not taken of that specialisation of function on which modern business rests.

Your correspondent refers to "a fairly high rate of interest." It is unfair to treat our charges as interest. They cover a very careful investigation of credit standing, the preparation of all documents and the collection of all instalments as well as the supply of money. That they are not exorbitant is, I submit, sufficiently proved by the growing volume of business which we transact.

J. GIBSON JARVIE,
*Chairman*, United Dominions Trust, Ltd.

London, E.C.2, July 15th, 1931.

### Induction Motors

Mr. D. G. Sandeman, in his article on induction motors on page 98 of your July 17th issue, does a serious injustice to modern repulsion induction motors when crediting them with a starting torque of 2½ times full-load torque.

One gathers that he considers this figure good, but from our own experience we would say that a motor which would only give 2½ times full-load torque would not pass the commercial test of any self-respecting manufacturer.

Single-phase repulsion-starting induction motors will often give a locked rotor torque as great as five times full-load torque.

POWER CONTRACTS (BATWIN), LIMITED,
H. G. Paxon, *Sales Dept.*

London, *July 18th*, 1931.

### Phase Shifters

Many thanks to your correspondents for their prompt and interesting letters on the above subject. I was a little hazy as to just what the objection was, but now I know better where I am up to, so to speak.

STUDENT.

Cape Town, South Africa, *June 25th*, 1931.

# Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

**1929.**

39,283. "Remote control and remote supervision systems." International General Electric Co., Inc. December 22nd, 1928. (351,387.)

**1930.**

1,781. "Light signals and light-signal systems." British Power Railway Signal Co., Ltd., S. L. Glenn, and E. E. Pierce. November 17th, 1930. (351,572.)

2,577. "Power-factor regulating systems." British Thomson-Houston Co., Ltd. January 26th, 1929. (351,504.)

5,581. "Connection of rubber-sheathed electric conductors to coupling members and the like." Kabelfabrik Akt.-Ges. February 25th, 1929. (Addition to 250,765.) (351,474.)

5,745. "Wave-signalling systems." Sir O. J. Lodge and J. Robinson. February 20th, 1930. (351,446.)

6,284. "Lead alloys more particularly for sheathings of electric cables." M. Thielers. February 25th, 1930. (351,449.)

8,822. "Electric remote control and supervisory systems." Standard Telephones & Cables, Ltd., S. Chapman, and A. Brown. March 19th, 1930. (351,454.)

8,852. "Arrangement for controlling or releasing electric currents by means of mechanical members." Siemens & Halske Akt.-Ges. February 15th, 1930. (351,455.)

9,006. "Electric condensers." C. H. Stave. March 20th, 1930. (Cognate application 15,132/30.) (351,516.)

9,113. "Oscillation-generation apparatus." Marconi's Wireless Telegraph Co., Ltd. May 3rd, 1929. (351,406.)

9,122. "Electric time switches." R. Hornby. March 21st, 1930. (351,415.)

9,135. "Switch constructions for signalling systems." B. L. Bobroff. November 6th, 1929. (351,407.)

9,245. "Multicore electric cables." C. W. Bloomfield. March 22nd, 1930. (351,480.)

9,269. "Photo-telegraphy." H. G. Bartholomew and J. W. Dalton. March 22nd, 1930. (351,462.)

9,349. "Means for and method of thermionic detection." S. Ballantine. April 10th, 1929. (351,464.)

9,385. "Thermionic valves." Lissen, Ltd., and C. W. Oatley. March 24th, 1930. (351,419.)

9,410. "Electrically-controlled game apparatus." T. Murphy and L. W. J. Collins. March 24th, 1930. (351,523.)

9,423. "Light-sensitive cells." F. H. Constable and Radiovisor Parent, Ltd. March 24th, 1930. (351,468.)

9,426. "Radio transmitting and receiving systems." Marconi's Wireless Telegraph Co., Ltd. March 22nd, 1929. (351,420.)

9,463. "Electro-magnetic sound-reproducers." M. Greenwood and G. E. Greenwood. March 25th, 1930. (351,470.)

9,639. "Telegraph circuits." Creed & Co., Ltd., and F. W. Jarvis. March 26th, 1930. (351,487.)

9,640. "Electro-magnetic relays." Creed & Co., Ltd., and R. D. Salmon. March 26th, 1930. (Addition to 302,259.) (351,488.)

9,641. "Loading coils." Standard Telephones & Cables, Ltd. (E. Maneschi). March 26th, 1930. (351,489.)

9,642. "Step-by-step private automatic exchange system employing common control apparatus." Standard Telephones and Cables, Ltd., L. P. Lowry, and W. S. Ball. March 26th, 1930. (351,490.)

9,643. "Electric cables." Standard Telephones & Cables, Ltd. July 20th, 1929. (351,491.)

9,644. "Supporting structures for electrical apparatus." Standard Telephones & Cables, Ltd., J. S. P. Roberton, and C. F. Ellis. March 26th, 1930. (351,492.)

9,684. "Electric cut-outs or fuses." G. Allsop and P. B. Smith. March 26th, 1930. (351,497.)

9,688. "Supply of X-ray installations." Naamlooze Vennootschap Philips Gloeilampenfabrieken. April 5th, 1929. (351,534.)

9,762. "Electric storage batteries." J. Lucas, Ltd., and G. D. Spencer. March 27th, 1930. (351,542.)

9,777. "Submarine signalling cables provided with repeaters." Electrical Research Products, Inc. March 30th, 1929. (351,543.)

9,848. "Generation of pulsating electric currents." Automatic Telephone Manufacturing Co., Ltd., and A. H. Williams. March 27th, 1930. (351,549.)

9,849. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and F. T. Belas. March 27th, 1930. (351,550.)

9,925. "Radio direction-finder." Standard Telephones and Cables, Ltd. (H. G. Busignies). March 28th, 1930. (351,553.)

9,926. "Telegraph-receiving apparatus." Creed & Co., Ltd., F. G. Creed, and R. D. Salmon. March 28th, 1930. (Addition to 228,842.) (351,554.)

9,987. "Electrically-driven vacuum cleaners." J. J. Hambidge and British Vacuum Cleaner & Engineering Co., Ltd. March 28th, 1930. (351,559.)

10,021. "Electric flow-discharge lamps." Marconi's Wireless Telegraph Co., Ltd. March 29th, 1929. (351,562.)

10,053. "Electric meters for use in mines and similar locations." G. F. F. Eager and Stringer & Son, Ltd. March 29th, 1930. (351,564.)

10,069. "Electric switches." R. A. Lister & Co., Ltd., and F. A. Attwood. March 29th, 1930. (351,566.)

10,085. "Interconnecting arrangements for automatic switches as used in telephone systems." Automatic Telephone Manufacturing Co., Ltd. (Associated Telephone & Telegraph Co.). March 29th, 1930. (351,568.)

10,105. "Electric heating apparatus." Credenda Conduits Co., Ltd., and P. W. Davis. March 29th, 1930. (351,569.)

10,444. "Electric discharge devices." General Electric Co., Ltd., J. W. Ryde, and H. G. Jenkins. April 2nd, 1930. (Cognate application 95/31.) (351,579.)

10,730. "Electric switches." J. Sachs. April 4th, 1930. (351,597.)

10,747. "Electrically-operated signs." R. Collier. April 4th, 1930. (351,598.)

10,770. "Means for transmitting indications to a distant point." Int. General Electric Co., Inc. April 4th, 1929. (351,601.)

10,775. "Impulse-senders for use in automatic telephone systems and the like." D. Macadie. April 4th, 1930. (351,602.)

10,858. "Electric cables." Macintosh Cable Co., Ltd., and A. Sargent. April 5th, 1930. (Cognate application 36,733/30.) (351,603.)

11,583. "Continuously-loaded submarine signalling cables." W. S. Smith, H. J. Garnett, and J. N. Dean. April 11th, 1930. (351,622.)

12,597. "Oscillation-generating apparatus." Marconi's Wireless Telegraph Co., Ltd. May 3rd, 1929. (351,639.)

13,495. "Battery-grid filling machine." W. F. Price. May 1st, 1930. (351,651.)

14,190. "Electrical instruments." Aron Electricity Meter, Ltd., E. W. Hill, A. White, and E. J. Riordan. May 8th, 1930. (351,657.)

15,325. "Wireless signalling system." R. F. Apter. May 19th, 1930. (351,675.)

15,504. "Mercury-vapour rectifiers." Akt.-Ges. Brown Boveri et Cie. July 26th, 1929. (351,678.)

16,463. "Road-traffic control systems." Automatic Signal Corporation. April 23rd, 1930. (351,703.)

16,897. "X-ray tubes." J. D. Frye and C. O. R. Andrews. May 31st, 1930. (351,709.)

16,909. "X-ray apparatus." W. E. Schall and Schall & Son, Ltd. May 31st, 1930. (351,710.)

16,988. "Control of electric transformers with on-load tap-changing gear." English Electric Co., Ltd., and A. R. Blandford. June 2nd, 1930. (351,711.)

17,943. "Permanent magnets for electro-dynamic loud-speakers." Naamlooze Vennootschap Philips Gloeilampenfabrieken. June 22nd, 1929. (351,723.)

19,473. "Electric switches." Maschinenfabrik Oerlikon. July 25th, 1929. (351,739.)

19,976. "Apparatus for examining crystalline bodies with the aid of X-rays." Naamlooze Vennootschap Philips Gloeilampenfabrieken. July 15th, 1929. (351,744.)

21,329. "Control of motor-driven electric arc or flame cutting or welding machines." Akt.-Ges. für Tiefbohrtechnik und Maschinenbau Vorm Trauzl & Co. July 13th, 1929. (351,763.)

22,972. "Contact fingers for electric machines and apparatus." C. Pedrazzo. July 30th, 1929. (351,787.)

23,607. "Metal-vapour rectifiers." Maschinenfabrik Oerlikon. April 14th, 1930. (351,795.)

24,600. "Ferro-magnetic systems of devices for converting electric oscillations into acoustic vibrations or conversely." Naamlooze Vennootschap Philips Gloeilampenfabrieken. September 19th, 1929. (351,805.)

26,576. "Electric pocket lamps." Pala a Spol. Akciova Tovarna Electrickych Clanku a Batterii ve Slanem and J. J. Pala. September 5th, 1930. (351,823.)

27,923. "Mercury electric switches." Dr. P. Meyer Akt.-Ges. September 18th, 1929. (Addition to 311,293.) (351,830.)

28,053. "Cages for screening inductance coils." Naamlooze Vennootschap Philips Gloeilampenfabrieken. October 3rd, 1929. (351,833.)

28,460. "Photo-electrically controlled machines." A. W. Isenthal. September 23rd, 1929. (351,838.)

29,525. "Electric lamps." British Thomson-Houston Co., Ltd. October 2nd, 1929. (351,850.)

29,762. "Automatic arrangement for synchronising two sources of electricity." Maschinenfabrik Oerlikon. October 12th, 1929. (351,851.)

30,389. "Dynamo-electric machines." International General Electric Co., Inc. October 10th, 1929. (351,857.)

33,669. "Electric cables." W. Brown. November 8th, 1930. (351,881.)

34,621. "Regulation of electric arc soldering machines." British Thomson-Houston Co., Ltd. November 16th, 1929. (351,883.)

35,874. "Electric gas or vapour filled arc discharge tubes." Naamlooze Vennootschap Philips Gloeilampenfabrieken. January 9th, 1930. (351,894.)

**1931.**

707. "Electrical pick-ups for talking machines." A. M. Low. April 8th, 1930. (Divided application on 11,090/30.) (351,899.)

1,157. "Electric warp stop-motions for looms." T. C. Wagner. January 13th, 1931. (351,901.)

1,901. "Installations comprising a plurality of electric discharge tubes having the shape of characters or other signs." Naamlooze Vennootschap Philips Gloeilampenfabrieken. February 7th, 1930. (351,903.)

2,191. "Electric switches." E. Hibou. January 23rd, 1930. (Divided application on 351,392.) (351,500.)

# Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 15th:—

Silo. No. 522,327. Class 6. Vacuum cleaning, floor polishing and washing machines.—C.C.A. (Vacuum Cleaners), Ltd., 324, Gray's Inn Road, W.C.1.

Isopress (lettering and design). No. 520,549. Class 8. Graduated knobs and disks for electrical purposes. No. 521,600. Class 50. Ditto, but made from synthetic resin.—Die Isopress Werke Gesellschaft, Berlin. (British representatives: Marks and Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

Effectone. No. 520,689. Class 8. Loud speakers and parts thereof.—"Radio" Gesellschaft vormals E. Manger & Co., Deisslingen-am-Neckar, Wurtemburg. (British representative: H. A. Turber, 57a, Holborn Viaduct, E.C.1.)

Castle. No. 522,590. Class 8. Electric dry batteries (not for medical purposes).—Berk & Dundas Fox, Ltd., 11, Farringdon Avenue, E.C.4.

Ostar Ganz (lettering and design). No. 523,137. Class 8. Thermionic valves.—Gustav Ganz & Co., Vienna. (British representatives: Lloyd Wise & Co., Lincoln's Inn, W.C.2.)

Setaw. No. 523,339. All goods in Class 8.—S. Kalisky (Aldgate), Ltd., 75, Aldgate High Street, E.C.3.

Duoflux. No. 522,165. Class 13. Reflectors and shades of ordinary metal for electric light.—Benjamin Electric, Ltd., Tariff Road, Tottenham, N.17.

Kenfyre. No. 521,831. Class 18. Electric and gas fires.—A. Kenrick & Sons, Ltd., Houghton Street, West Bromwich.

# New Work for Contractors

## Particulars of new works and building schemes for the use of electrical installation contractors and traders

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Addiscombe.**—Houses (24), Davidson Road; J. W. Hall, Hillingdon, Addiscombe Road.

**Altrincham** (CHESHIRE).—Houses (222) for the U.D.C.; surveyor.

**Barnsley.**—Catholic schools; Dyson, Cawthorn & Coles, architects, 10, Regent Street.

**Beccles** (SUFFOLK).—Houses (50), Ellough Road, for the T.C.; C. L. Hamby, borough surveyor.

**Belper** (DERBYSHIRE).—Houses (36) for the R.D.C.; G. Pym, clerk, 122, Bridge Street.

**Blackburn.**—St. Aidan Church (£10,000); Fairbrother & Hall, architects, Lawcourt Chambers.

**Blackpool.**—Branch premises, 127, Lytham Road, for Martin Bank, Ltd., Water Street, Liverpool; H. Joyce & Sons, Ltd., builders, 55, Hove Road, St. Annes-on-Sea.

**Bootle.**—Extension of secondary school and junior technical school; director of education.

**Bradford.**—Enlargement of Thornbury School; city architect. Houses, Ashfield Avenue, Frizinghall; J. Chippindale.

**Brierley Hill** (STAFFS.).—Houses (150), Silver End, for the U.D.C.; surveyor.

**Bristol.**—Houses (56), Bedminster, for the T.C.; city engineer.

**Bromham.**—Mental colony for the Bedfordshire and Northants C.C.; Whitwell & Son, architects, Birmingham.

**Carlisle.**—Aerodrome, Kingston; city engineer. Alterations to bakery, Bush Lane; H. Foxall, architect. Houses (230) for the C.C.; P. Dalton, architect, Council Chambers.

**Chesterfield.**—Houses (22), Walton Crescent; borough engineer.

**Colwyn Bay.**—Public abattoir; surveyor to the U.D.C.

**Crawcrook-on-Tyne.**—R.C. church; Stienlet & Maxwell, architects, 5, Saville Chambers, Newcastle-on-Tyne.

**Croydon.**—Houses (22), Hayling Park Estate; J. G. Cooper, "Threeways," Smitham Downs Road, Purley. Drapery stores, 35-45, Frith Road; G. Baines & Sons, 121, Victoria Street, S.W.1. Senior school, Rockmount (£13,560); F. R. Hipperson, Ltd.

**Durham.**—School, Hunwick, for C.C.; Messrs. Barron, contractors, Coundon, Bishop Auckland. Remodelling of Boldon Colliery Boys' School, for the county E.C. (£3,500); J. Carter and Sons, Ltd., Sunderland.

**Edinburgh.**—Houses (112) and shops, and conversion of hospital into school for the Corporation; city architect. Extensions to Heriot-Watt College (£175,000); the principal.

**Exeter.**—Bank for Barclays Bank, Ltd.; Stephen & Son, Ltd., builders, 9, Bedford Circus. Telephone exchange, Pinhoe, for H.M. Office of Works, King Charles Street, London, S.W.

**Gateshead.**—Methodist church and new church at Sunniside; S. J. Stephenson, architect, 2, Saville Place, Newcastle-upon-Tyne.

**Glossop.**—Alterations and additions, All Saints' R.C. schools; managers.

**Great Yarmouth.**—School, Gorleston (£10,296), for the borough E.C.; director of education. Rebuilding 3 & 4, King Street, for Messrs. Bonings.

**Hampshire.**—Senior school, Andover, and extensions, Baddesley School (£7,000), for the county E.C.; county architect, Winchester.

**Hatfield** (HERTS.).—Union Church (£6,300), with lighting and heating; J. Ray, builder, Letchworth. School (480 places) for the county E.C.; A. E. Prescott, county architect.

**Hebburn-on-Tyne.**—Houses (66), Jerves Street, for the U.D.C.; T. A. Paget & Sons, architects, 37, King Street, South Shields.

**Herne Bay.**—Houses (80), Claremount estate; U.D.C. surveyor.

**Huyton** (LANCS.).—Liverpool College for girls (£40,000); E. Quiggin, architect, Liverpool.

**Irish Free State.**—(CLADDAGH, GALWAY).—National school; Michael J. Tighe, architect, St. Anne's. (CORK).—Electric lighting for Public Health Offices, Parnell Place, for the City Manager; city engineer, Town Clerk's Office, Fitzgerald Park. (FERMOY, Co. CORK).—Electric lighting installation at County Hospital, for North Cork County Board of Health; engineer, County Home, Mallow. (CORALSTOWN, WESTMEATH).—National school; Rev. M. Dillon, parish priest, Kinnegad. (MULLINGAR, Co. WESTMEATH).—Erection of duplicate sets centrifugal pumps and electric motors, County Board of Health; P. H. McCarthy, consulting engineer, 26, Lower Leeson Street, Dublin.

**Kelso.**—Houses (32); burgh surveyor.

**Leyburn** (YORKS.).—Housing scheme for the U.D.C.

**Lewes.**—Telephone exchange for H.M. Office of Works, King Charles Street, London, S.W.

**Littlehampton** (SUSSEX).—Houses (52) for the U.D.C.; surveyor.

**London.**—(BETHNAL GREEN).—Dwellings, Collingwood Estate (£6,790); Canonbury Construction Co., Ltd. (EAST HAM).—Alterations, 234-8, High Street North; W. D. Key, architect. (LEYTON).—Baths and public washhouses (£179,000) for the T.C.; borough surveyor. (SOUTHWARK).—Reconstruction of Hard Street area (£139,000): L.C.C. architect. (WOOLWICH).—Houses (400), Middle Park estate, for the T.C.; borough surveyor. (BLACKHEATH).—Houses (31), Kidbrook Park Road; Walker, Clinging & Co. (PLUMSTEAD).—Houses (250), Churchfield estate; Eley & Allen. Houses (27), Manton Road; W. F. Cabe. Factory extensions, King's Highway, and houses, Bassant Road; Wright & Renny. (TOOTING).—Additions, 196-8, Upper Tooting Road; Royal Arsenal Co-operative Society, Ltd.

**Lowestoft.**—Workshop, Hamilton Road; L.B.S. Engineering Co.

**Manchester.**—Branch stores, Middleton Road, Crumpsall, for the Blackley Co-operative Society, Ltd., Market Street, Blackley; architects' department, Co-operative Wholesale Society, Ltd., Balloon Street.

**Matlock.**—Additions to Derwent Mills for Derwent Mills, Ltd., Smedley Street; H. Hunt & Sons, builders, Ripley, Derby.

**Middleton.**—Elementary school, Alkrington; director of education.

**Morden.**—Cinema and arcade for shops, &c., Bishopsford Road; L. Osloff & L. Rolnick. Shops (28), St. Helier estate; S. C. Prior and A. F. Wallace.

**Newcastle-on-Tyne.**—Reconstruction of Town Hall for C.C. (£75,000). School, Wharrier Street (1,650 places), for the E.C.; E. F. W. Liddle, 12, Eldon Square.

**Northampton.**—Senior school, Finedon Road, Irthlingborough, for the county E.C.

**Northern Ireland.**—BELFAST.—Rebuilding of the Mountpottinger Kinema; J. E. Cull, builders, Jonesboro' Street.

**Oxford.**—Buildings, corner of Carfax (£25,788); Hinkins and Frewin. Development of Great Headley estate; Cripps and Stewart. Premises, Castle Street (£2,500); D. A. Savage. Secondary schools; city estates surveyor.

**Pendleton** (SALFORD).—Kinema, with electrical work; P. Cummings, architect, 51, King Street, Manchester.

**Perth.**—Extensions, Royal Infirmary; Medical Superintendent.

**Peterborough.**—Houses (70) for the T.C.; W. H. A. Court, city engineer.

**Pontefract.**—Alterations and improvements to King's School; Thisltер & Taylor, architect, 25, Ropergate.

**Portsmouth.**—Houses (56), Tangier Road; McCarthy Bros. Houses (21), Walburton Avenue, Cosham; C. W. Stigant. Aerodrome; G. Dawbarn and Mr. Norman, architects. Covered bowling rinks, Northern Parade; Alexander Bowling and Social Club. Additions, factory, Highland Road; Leatham & Co., Ltd. Stores, 171, Commercial Road; Marks & Spencer.

**Potter's Bar** (MIDDLESEX).—Houses (118), Cranborne Road estate; D. Leighton & Son, builders, London Road South, Lowestoft.

**Prescot.**—Public library and offices; F. A. Gregson, surveyor to the U.D.C.

**Preston** (LANCS.).—Business premises, Walton-le-Dale, for the Co-operative Society; G. H. Broadbent, architect, 12, Guildhall Street.

**Richmond** (SURREY).—Extensions, Wesleyan College; E. Maufe, architect, 3, Raymond Buildings, London, W.C.

**Rochdale.**—Fire station; S. H. Morgan, borough engineer.

**Rochester.**—Re-wiring sections of St. Bartholomew's Hospital; Read & McDermott, architects, 161, High Street.

**Rugby.**—Houses (39), Southfield estate, for Browning Bros., Checketts Road, Leicester.

**Sedgley.**—Alterations, 34, High Street; Dudley Co-operative Society, Ltd.

**Shaftesbury** (DORSET).—Houses (38) for the T.C.; J. P. Jenkins, borough surveyor.

**Shipley.**—Rebuilding, kinema, Briggate; Shipley Picture House Co.

**Shirley.**—Fire station, Lower Addiscombe Lane (£20,000); Croydon, borough engineer.

**Smethwick.**—School (1,000 places), Hall estate, for the borough E.C.; director of education.

**Somerset.**—Senior school, Langport, for the county E.C.; director of education, Wester-super-Mare.

**South Shields.**—Shops and houses for Mr. Brown; Henderson Bros., contractors, Smith Street, Tyne Dock.

**Sunderland.**—School, Commercial Road, for the E.C.; O. T. Mark, Education Offices, John Street.

**Sutton-in-Ashfield** (NOTTS.).—Houses (27) and bungalows for the U.D.C.; Warner & Dean, architects, Mansfield Road.

**Swansea.**—Houses (100), Townhill estate; borough architect. Rebuilding, 237-8, High Street; Montague Burton, Ltd. Additions, St. Mary's Convent, Convent Road; Rev. Mother Superior.

**Tadcaster** (YORKS.).—Houses (94) for the R.D.C.; surveyor.

**Tayport.**—Church, King Street; trustees, United Free Church.

**Thornaby.**—Houses (100) for the T.C.; surveyor.

**Truro** (CORNWALL).—Houses (50), St. George's Road, for the T.C.; F. A. Barnes, city surveyor.

**Waddon.**—Factory, Mitcham Road; J. C. Brewer & Co., 116, Putney Bridge Road, S.W.15.

**Wallsend.**—Houses (700) during next five years for the T.C.

**Walton-on-the-Hill** (SURREY). — Congregational Church (£2,750); F. Smith & Sons, builders, Tadworth.

**Warrington.**—Houses (216), Loushers Lane estate, for the T.C.; A. M. Ker, borough engineer.

**Warwickshire.**—Extensions, Rugby High School for girls, for the county E.C.; A. C. Bunch, county architect, Leamington Spa.

**Watford.**—Houses (60), Leavesden Green estate; borough engineer. Arcade and shops, High Street; Watford Market Arcades, Ltd. Bank and shops, Chalk Hill; J. Rodwell. Development, Bradshaw estate; Fayers & Fayers. Shops, offices and flats, Longspring; Kempster & Williams.

**Welwyn** (HERTS.).—Houses (54), Broomfield, for the R.D.C.; C. B. Borthwick, surveyor.

**West Riding.**—School, Cliff House estate, Crigglestone, premises for Grammar School, Tadcaster, and extensions, technical institue, Morley (£3,500), also reconstruction of Alexandra Street school, Goole (£9,000), for the county E.C.

**West Ward.**—Houses (50) for the R.D.C.; surveyor, Penrith.

**Weymouth.**—Extensions, Royal Eye Infirmary; Young & Hall, architects.

**Whickham** (DURHAM).—Houses (60), Dunston (£20,730) for the U.D.C.; R. Southern, builder, Dipton, Annfield Plain.

**Whitefield.**—Rehousing scheme, Moss Lane; surveyor to the U.D.C.

**Whitstable** (KENT).—Houses (28), Westmeads, for the U.D.C.; G. Dunkin, surveyor.

**Wickford.**—Mental colony, Runwell Hall estate; Southend and East Ham Corporations.

**Worsley** (LANCS.).—Houses (128) for the U.D.C.; surveyor.

**Wrexham.**—Extension of Joint Fever Hospital (£11,000); E. W. Dettin, contractors, Johnstown.